TECHNICAL REPORT

Sea ice reports for the Antarctic shipping season 2017 - 2018

Prepared by Dr Jan L Lieser

ANTARCTIC GATEWAY PARTNERSHIP
A Special Research Initiative of the Australian Research Council

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Sea ice reports for the Antarctic shipping season 2017–2018

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This research was also supported under Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership (Project ID SR140300001).

Executive summary

The sea-ice reports compiled in this document are weekly reports on sea-ice conditions for East Antarctica, including sub-weekly updates. They were prepared to support ship operations in East Antarctica during the 2017/2018 shipping season. These reports were primarily used to inform the Australian Antarctic program, but were provided to other Antarctic operators as well. In particular, we assisted the Royal New Zealand Navy (HMNZS *Otago*), the Australian Marine National Facility (RV *Investigator*), New Zealand's National Institute of Water and Atmospheric Research (RV *Tangaroa*), US National Science Foundation (RVIB *Nathaniel B. Palmer*), and a commercial fishing operator.

Throughout the shipping season, the focus of individual reports shifts with the main purpose of specific voyages of the Australian Antarctic research and supply vessel *Aurora Australis* and other customer requirements. The Antarctic voyages of RSV *Aurora Australis* in the 2017/2018 season were:

No.	Depart port	Main Purpose	Return to port
V1	29/10/2017	Davis Station resupply	03/12/2017
V2	13/12/2017	Casey Station resupply	11/01/2018
V3	16/01/2018	Mawson Station resupply; Davis summer retrieval	06/03/2018

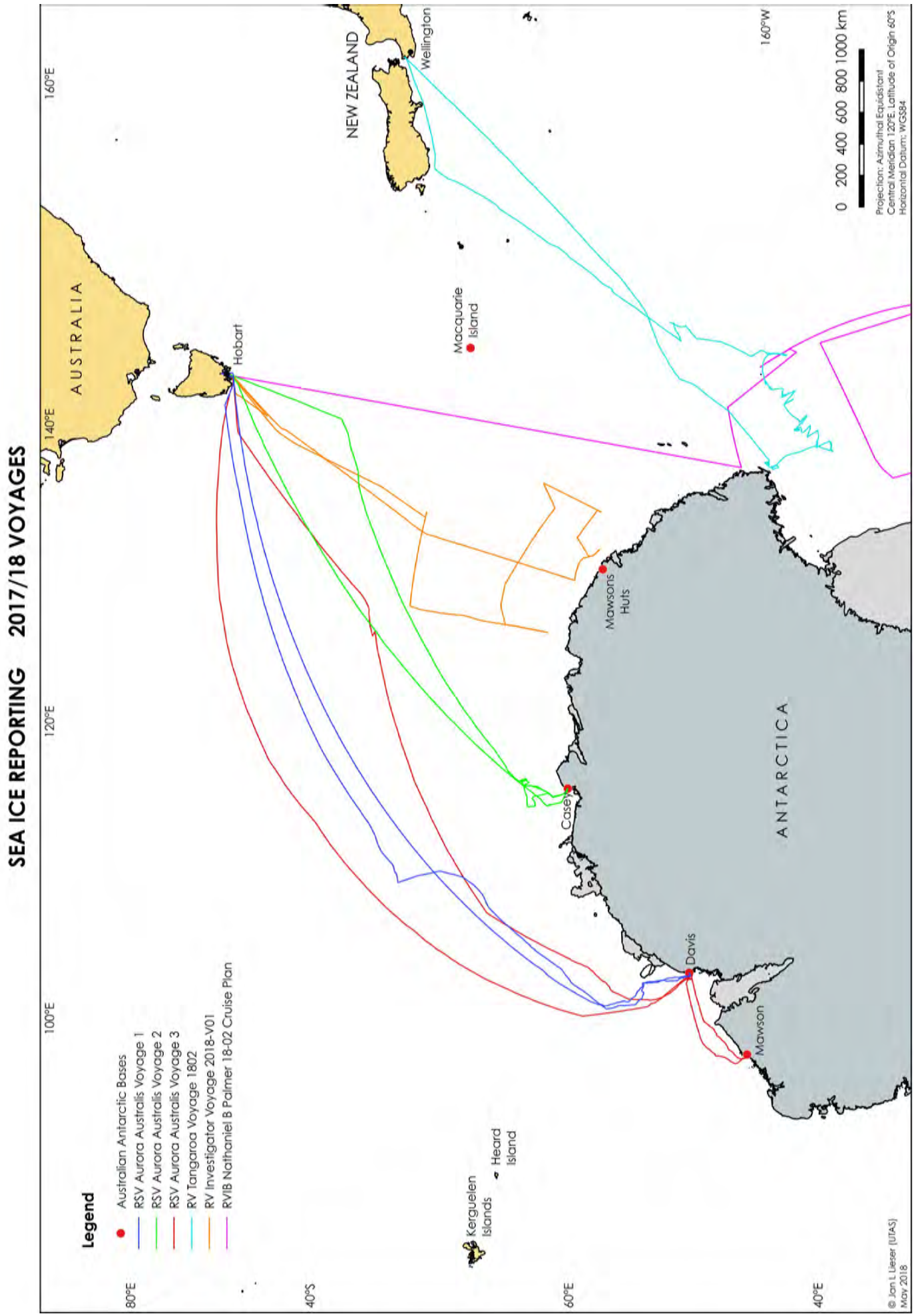
In early 2017, the distribution of sea ice around Antarctica was preconditioned by very low sea-ice extent at the end of 2016, which was, however, heterogeneously distributed around the continent. Higher sea-ice concentration were observed in East Antarctica and the Weddell Sea whereas in much of the rest of Antarctica the coast was exposed to the ocean. On 01/03/2017, overall sea-ice extent reached its annual minimum of 2.07×10^6 km^2 marking a new record low extent, which occurred also about two weeks later than typical. In autumn, warm, northerly air advection and elevated sea-surface temperatures delayed sea-ice growth around West Antarctica and the Ross Sea. Throughout winter, the sea-ice extent remained below the envelope of two standard deviations of the median. By mid-September, sea-ice extent appeared to have peaked just above 18.01×10^6 km^2 when it began to decline again, but reached its annual maximum extent only on 09/10/2017 with 18.06×10^6 km^2, which was about a week later than the previous latest sea-ice maximum (observed in 1988).

The re-emergence of the so-called Maud Rise Polynya was also observed from mid-September and throughout austral spring 2017. In early December, the polynya reached an extent of more than 250 000 km^2 (comparable to the size of New Zealand). Research is ongoing attributing the causes and effects of this occurrence, but it is expected to be linked to a similar, although shorter lived and smaller event in 2016.

About this report

This compilation is the seventh volume of sea-ice reports prepared by the Sea Ice Service of the Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership and is supported by the sea-ice group of the Antarctic Climate & Ecosystems Cooperative Research Centre and the Australian Antarctic Division. The first report of this compilation was issued in calendar week 19 of 2017, after the 2016/2017 shipping season ended in May 2017.

Previous volumes are available from the Manager Communications, Antarctic Climate & Ecosystems Cooperative Research Centre (see inside cover for details) and online here: http://acecrc.org.au/services/sea-ice-charting/


SEA ICE REPORTING 2017/18 VOYAGES
Legend
Australian Antarctic Bases
RSV Aurora Australis Voyage 1
RSV Aurora Australis Voyage 2
RSV Aurora Australis Voyage 3
RV Tangaroa Voyage 1802
RV Investigator Voyage 2018-V01
RVIB Nathaniel B Palmer 18-02 Cruise Plan
AUSTRALIA
NEW ZEALAND
ANTARCTICA
Hobart
Wellington
Macquarie Island
Mawsons Huts
Casey
Davis
Mawson
Heard Island
Kerguelen Islands
80°E
100°E
120°E
140°E
160°E
160°W
40°S
60°E
40°E
0 200 400 600 800 1000 km
Projection: Azimuthal Equidistant
Central Meridian 120°E, Latitude of Origin 60°S
Horizontal Datum: WGS84
© Jon L Lieser (UTAS)
May 2018

Contents

Frequently used acronyms

AMSR-2 [1]	Advanced Microwave Scanning Radiometer 2
BoM	Bureau of Meteorology (AUS)
DNB	Day-Night Band (panchromatic VIIRS channel)
ESA	European Space Agency
EW	Extra Wide swath (a SAR mode)
FASBI	Call sign: Offshore Patrol Vessel *l'Astrolabe*
IBCSO	International Bathymetric Chart of the Southern Ocean
ICDC	Integrated Climate Data Centre, University of Hamburg (GER)
IW	Interferometric Wide swath (a SAR mode)
JAXA	Japan Aerospace Exploration Agency
MODIS [2]	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration (USA)
NSIDC	National Snow and Ice Data Center (USA)
OLI	Operational Land Imager (scientific payload on Landsat-8 satellite)
OSI-SAF	Ocean and Sea Ice Satellite Application Facility
SAR	Synthetic Aperture RADAR
Suomi NPP	Suomi National Polar-orbiting Partnership
USGS	United States Geological Survey (USA)
VIIRS	Visible Infrared Imaging Radionmeter Suite
VIS	Visible Spectrum

[1] The AMSR-2 instrument is onboard the GCOM-W1 satellite, which is operated by JAXA.
[2] The MODIS instrument is operational on two satellites: AQUA and TERRA, both operated by NASA.

Sea Ice Report #19.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

04/05/2017

Cooperation Sea

Figure 1 shows a composite of SAR and microwave data, north of Davis Station. Areas of near-shore fast ice are marked with a red outline.

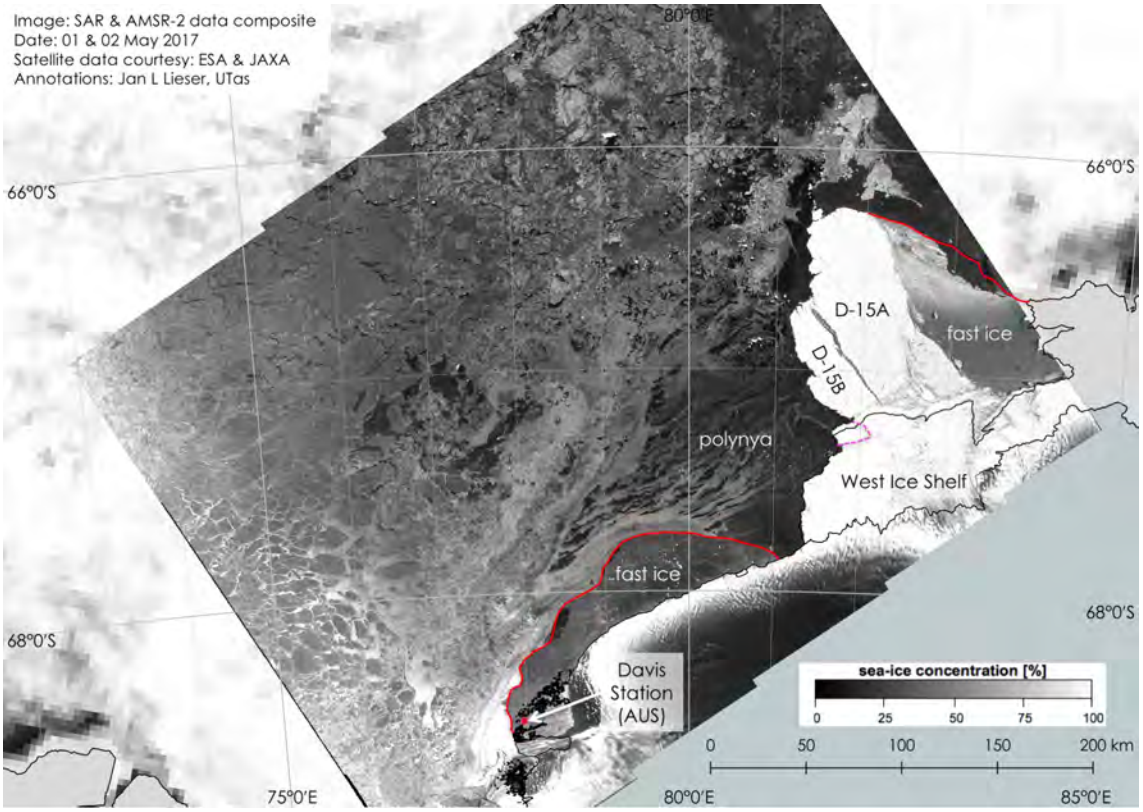


Figure 1: Sentinel-1a SAR and sea-ice concentration composite: SAR scene acquired 01/05/2017 at 14:47 UT and provided by PolarView; background: AMSR-2 sea-ice concentration data acquired 02/05/2017 and provided by Universität Hamburg.

Off Davis Station, fast ice is growing and slowly surrounding the Vestfold Hills, from the north towards Sørsdal Glacier south of the hills. Sea ice can be seen forming as strips and patches, in the polynya west of the West Ice Shelf.

Iceberg D-21B (see Sea Ice Report #13.1/2017) was last observed at 76° 43' E and 66° S, on 27/04/2017, but has travelled further west now.

*Disclaimer: *Every effort is made to ensure the data provided in this report are accurate at the date of publication; however the report is provided without warranty of any kind. The figures and charts provided in this report are intended only as a guide to ice conditions and are not suitable for navigation.*

Sabrina Coast

Figure 2 shows a SAR and microwave data composite, off Sabrina Coast.

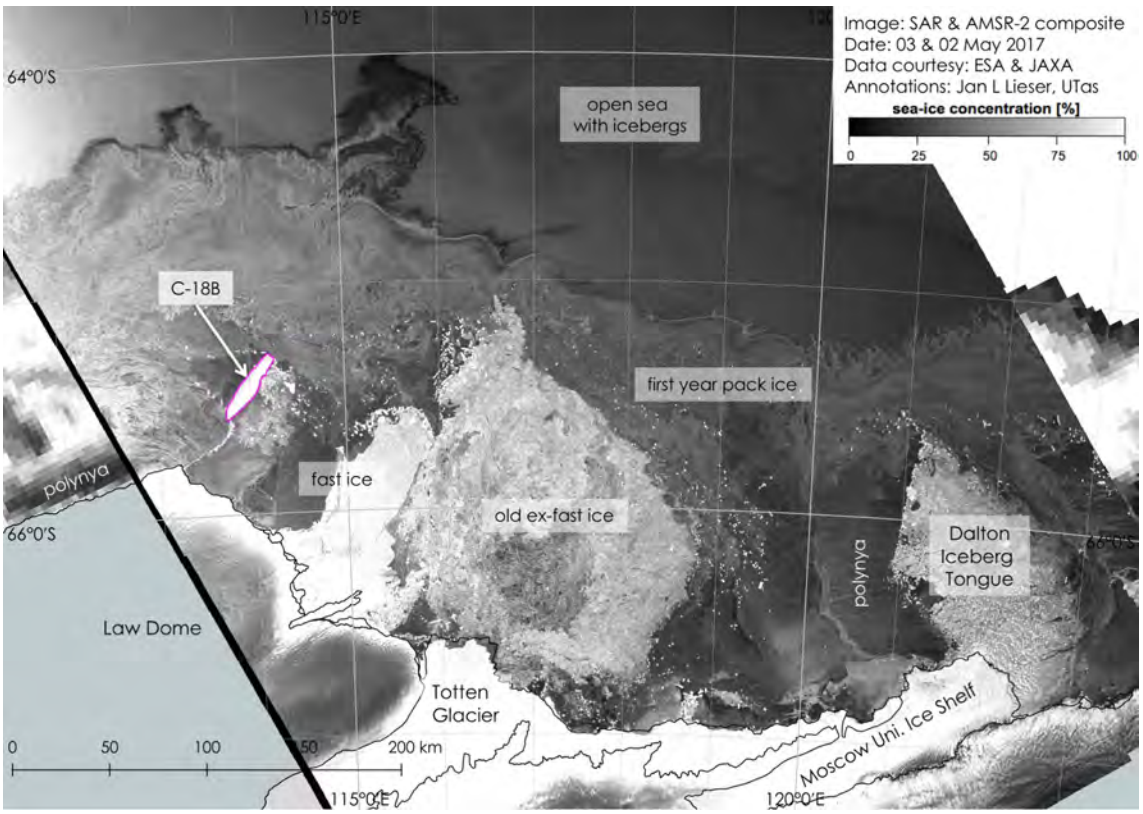


Figure 2: Sentinel-1b SAR and sea-ice concentration composite: SAR scene acquired 03/05/2017 at 12:02 UT and provided by PolarView; background AMSR-2 sea-ice concentration data acquired 02/03/2017 and provided by Universität Hamburg.

West of the Dalton Iceberg Tongue, a polynya appears active and new sea ice is accumulating against old ex-fast ice, which can be identified as light grey mass (due to its high RADAR reflectivity), north of Totten Glacier.

D'Urville Sea

Figure 3 shows a SAR scene of D'Urville Sea, between Dumont D'Urville Station and Mertz Glacier.

Iceberg C-15 has moved slightly further northward and appears to have pushed iceberg C-29 a bit, since late March.

A piece of iceberg B-9B was sheared off the berg (about 15.5 km^2, see yellow circle in Figure 3), due to a roughly 2 km westward shift of the berg.

Figure 4 shows a visible scene of the wider region. The position of the SAR scene shown in Figure 3 is indicated by the blue frame.

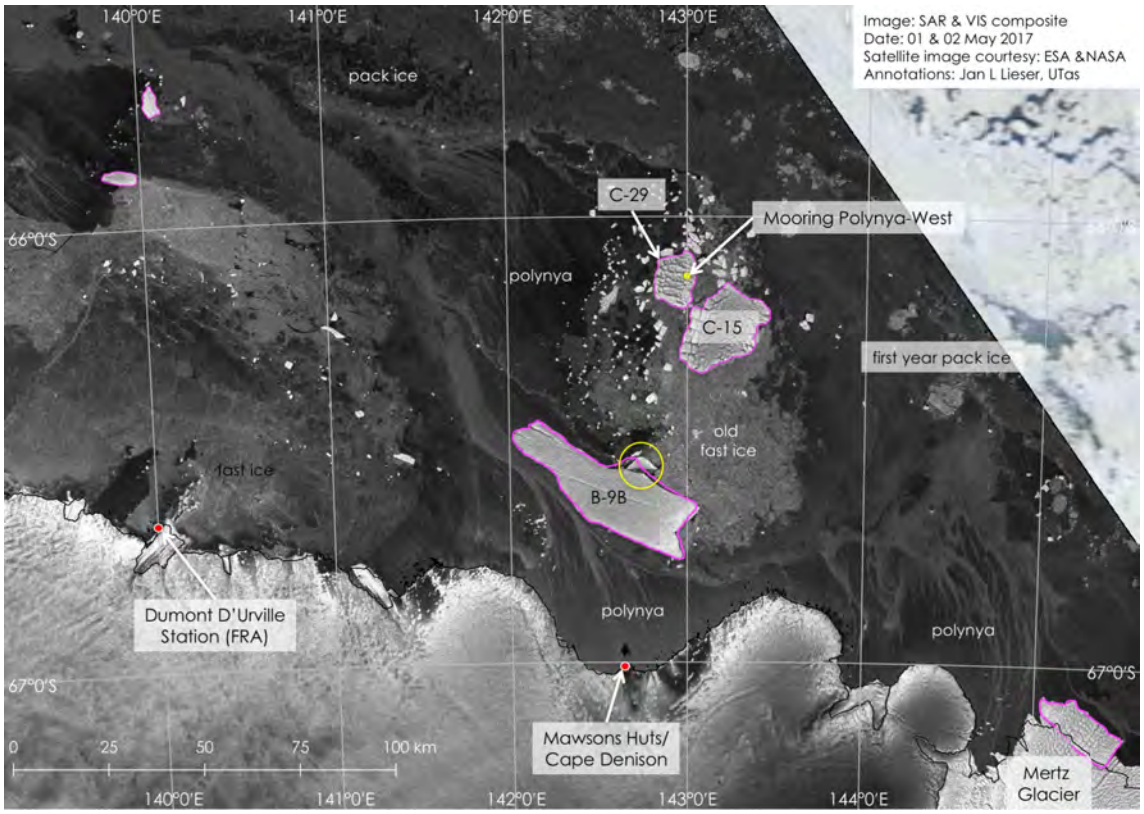


Figure 3: Sentinel-1b scene, data acquired 01/05/2017 at 10:40 UT and provided by PolarView; Background see Figure 4.

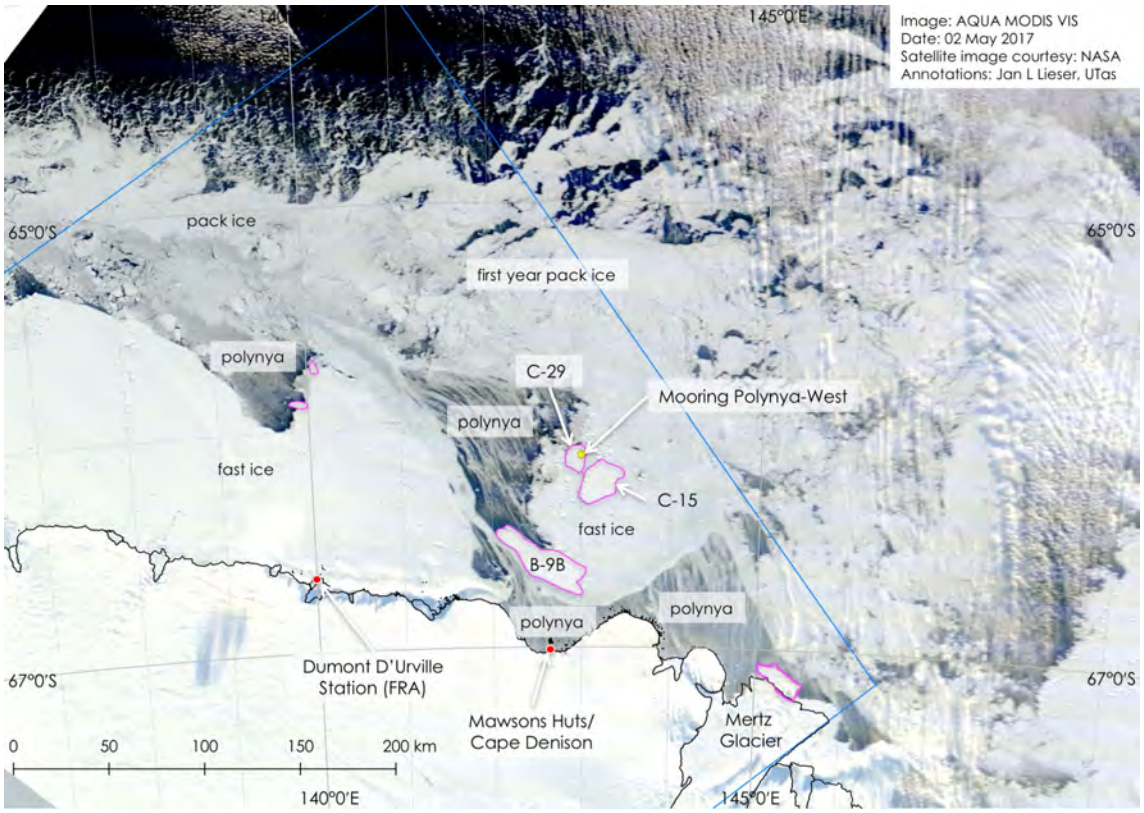


Figure 4: AQUA MODIS VIS scene, data acquired 02/05/2017 and provided by NASA.

Sea Ice Report #20.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/05/2017

Antarctica

Figure 1 shows a map of pan-Antarctic sea-ice concentration anomaly for April 2017.

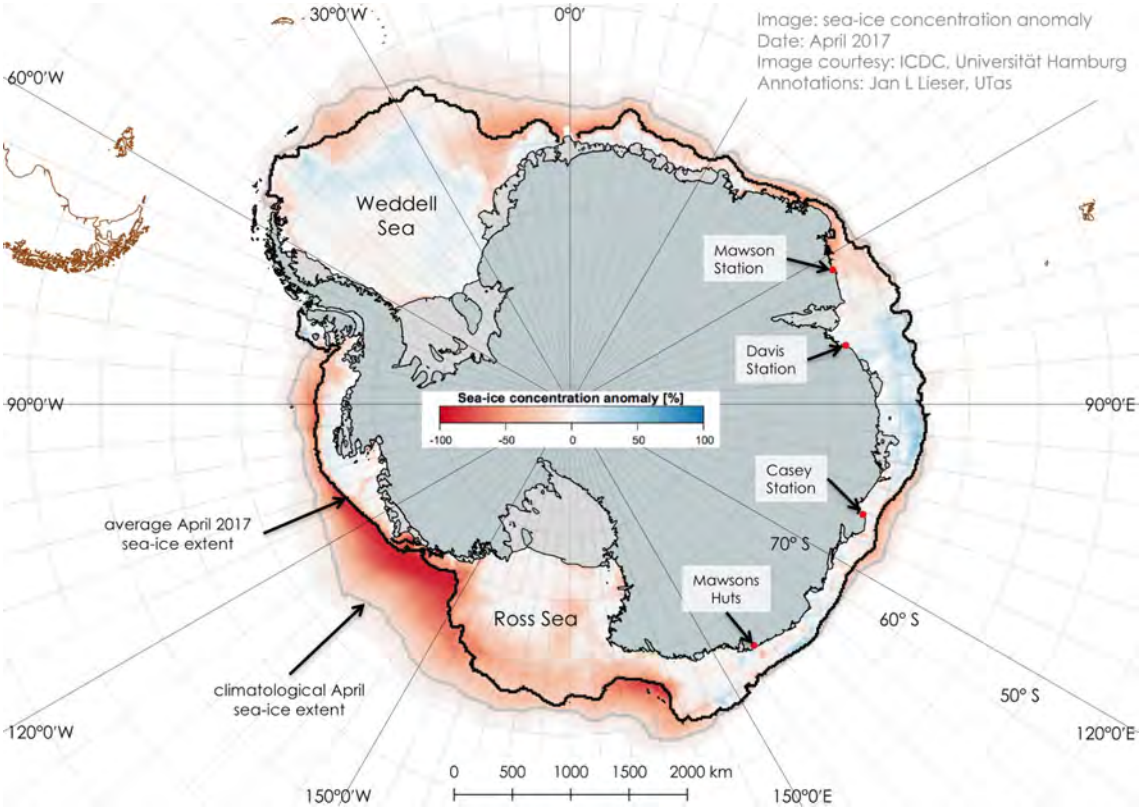


Figure 1: Sea-ice concentration anomaly, data provided by Universität Hamburg.

Colour coded is the anomaly of the April 2017 sea-ice concentration average relative to the climatology of April conditions of the reference period (1992 – 2016). The black line denotes the April 2017 average sea-ice extent (calculated for sea-ice concentration greater 15%) and the grey line gives the climatological April sea-ice extent for the reference period.

In East Antarctica, we note a mixed concentration-anomaly signal within the climatological sea-ice extent, but between 100° E and 120° E we also note lower than average sea-ice extent.

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Sea Ice Report #22.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/05/2017

Antarctica

Figure 1 shows a map of pan-Antarctic sea-ice concentration together with the median sea-ice extent for May (yellow line).

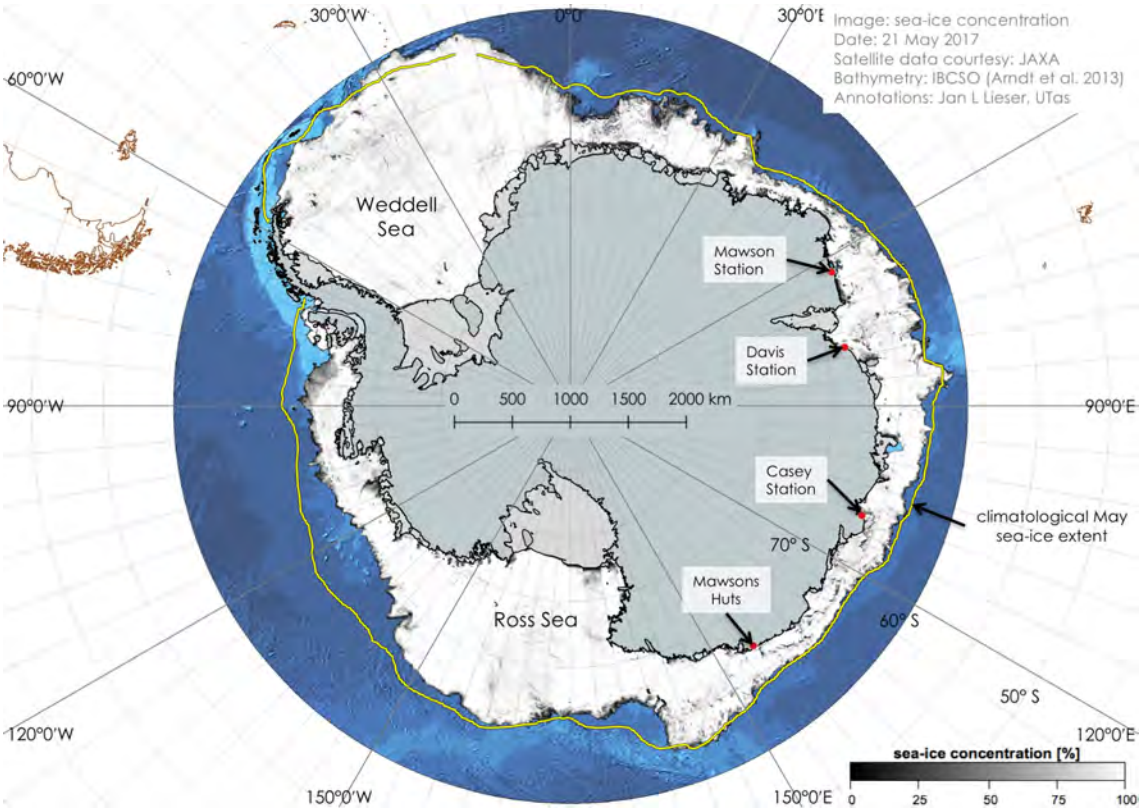

Figure 1: AMSR-2 sea-ice concentration, acquired 21/05/2017 and provided by Universität Hamburg.

Around Antarctica, sea-ice extent is well within the limit of the long-term median resulting in below average sea-ice area as well as extent. Only one region in the eastern Weddell Sea is currently experiencing slightly above average conditions.

We also note a polynya of at least 3700 km^2, offshore of Mawson Station. Off Cape Denison (Mawsons Huts), a smaller polynya (roughly 300 km^2) appears to be slowly back-filling with new sea ice, accumulating against iceberg B-9B.

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Sabrina Coast

Figure 2 shows a high-resolution SAR scene, off Sabrina Coast.

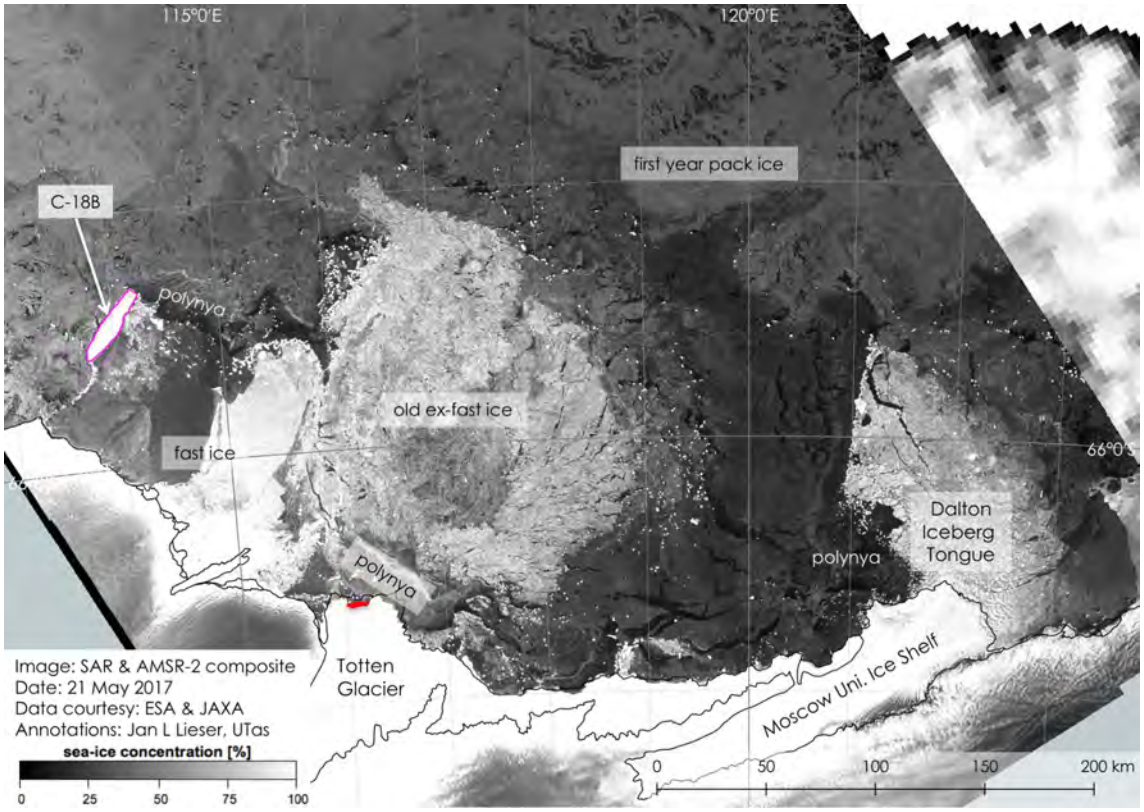

Figure 2: Sentinel-1a SAR, acquired 21/05/2017 at 12:03 UT and provided by PolarView; AMSR-2 sea-ice concentration, acquired 21/05/2017 and provided by Universität Hamburg.

A polynya is present, off the northern face of Totten Glacier, and roughly 18 km^2 of glacier has broken away (red shape in Figure 2) during April, resulting in at least 10 new icebergs drifting northward.

Within the Dalton Iceberg Tongue, a couple of large cracks through the fast ice between the icebergs are visible in the SAR scene, which are a result of kinematic stress on the fast ice.

Sea Ice Report #23.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

29/05/2017

Mawson Station

Figure 1 shows a sea-ice concentration chart off Mawson Station.

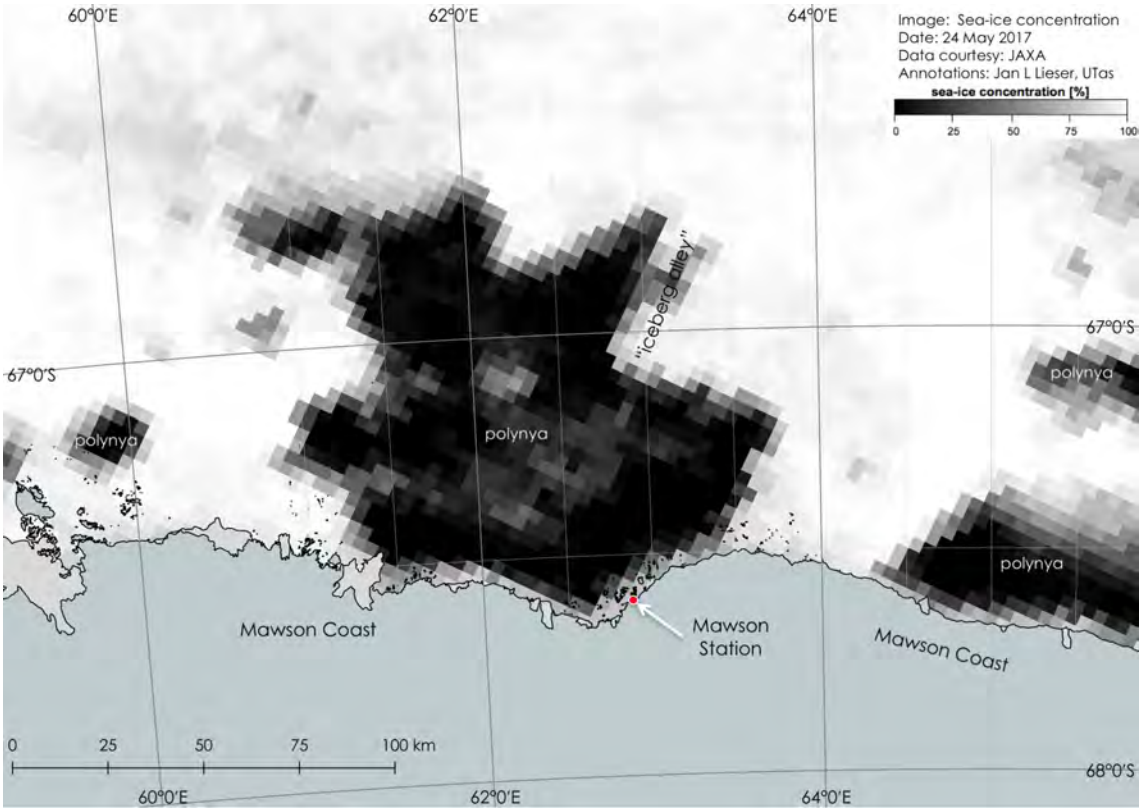

Figure 1: AMSR-2 sea-ice concentration acquired 24/05/2017 and provided by Universität Hamburg.

A rather large polynya of at least 8000 km^2 was present offshore Mawson Station late last week. Further east, the so-called 'Cape Darnley Polynya', off the eastern part of Mawson Coast (and Lars-Christensen Coast further east, outside the frame of Figure 1), is also active.

Figure 2 shows the same frame as Figure 1, but a high-resolution SAR scene. Characteristic new ice signatures can be identified in the above mentioned polynya regions, where strips and patches of newly forming sea ice are drifting in northwesterly directions.

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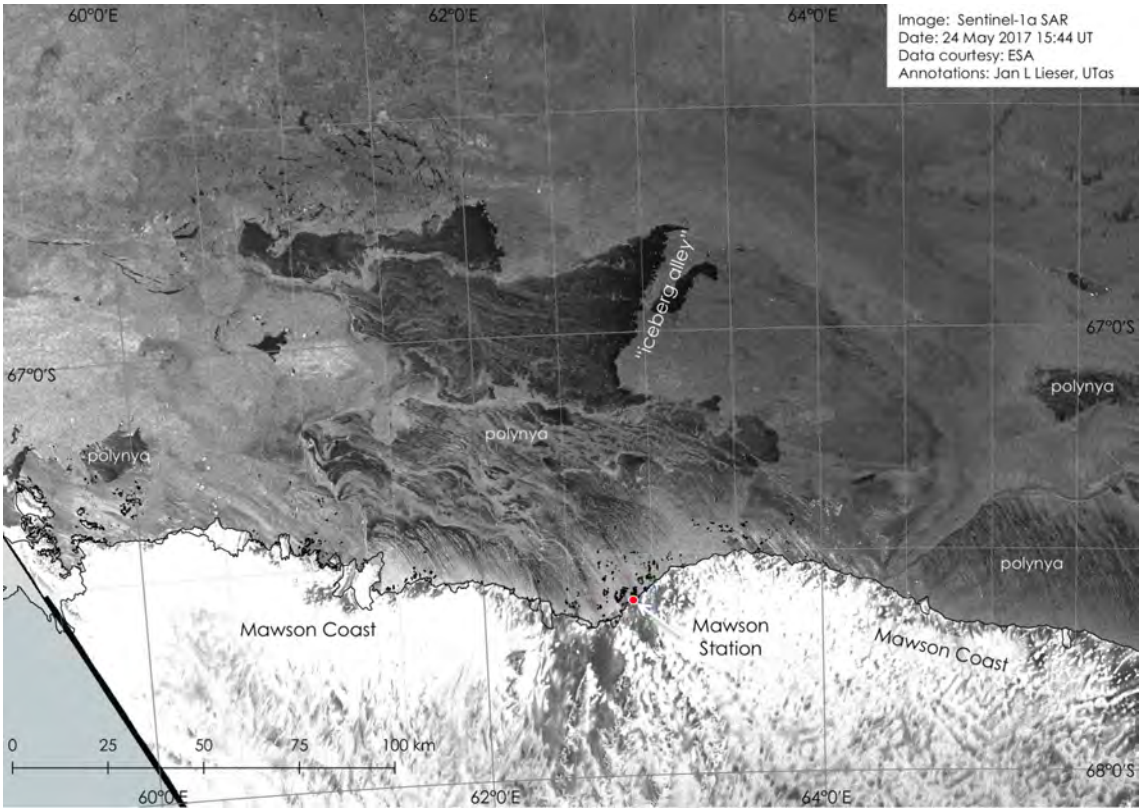

Figure 2: Sentinel-1a SAR acquired 24/05/2017 at 15:44 UT and provided by PolarView.

Sea Ice Report #24.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/06/2017

Antarctica

Figure 1 shows the average sea-ice concentration around Antarctica, in May 2017. Also shown is the median sea-ice extent for May as a yellow line.

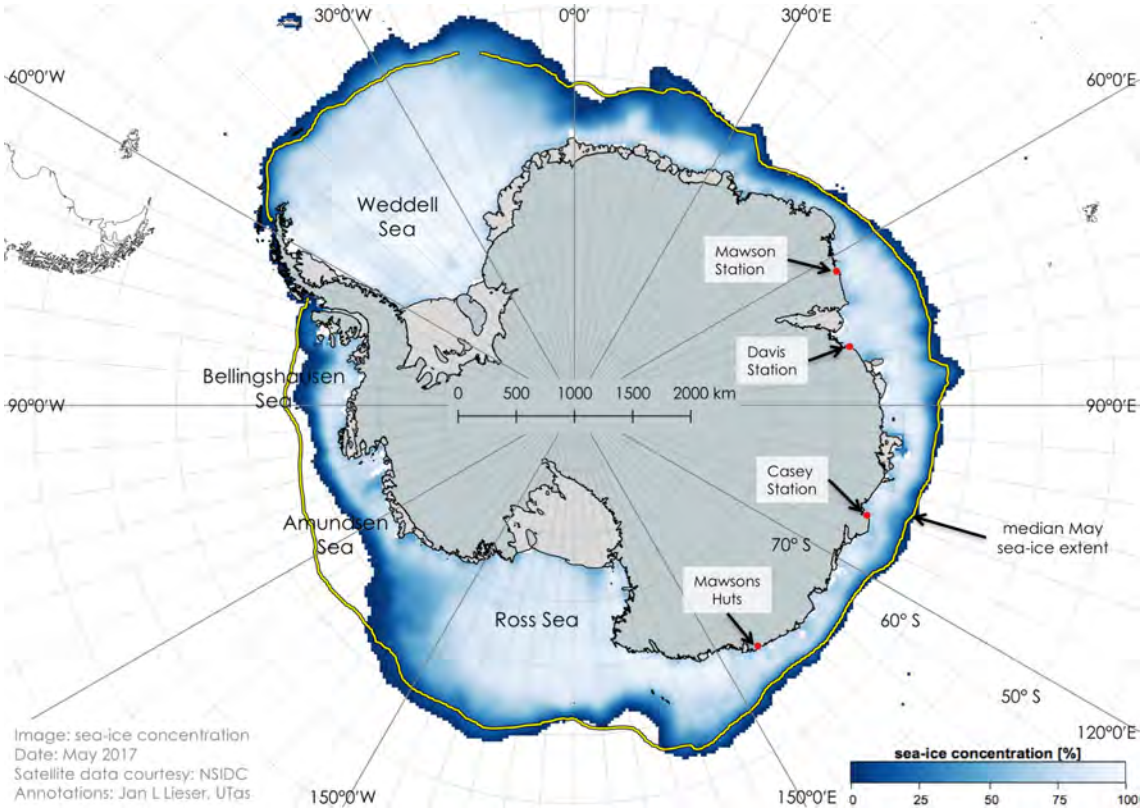

Figure 1: Average sea-ice concentration of May 2017 provided by NSIDC.

The pan-Antarctic sea-ice extent was generally below average during May, even though it appears to be largely within the boundaries of the median. Exceptions form the eastern Weddell Sea and eastern Ross Sea, which experienced above average extent (although the latter to a lesser degree). These above average conditions where more than outweighed by below average conditions in Bellingshausen Sea and Amundsen Sea and to a lesser degree the western Ross Sea.

While the rate of sea-ice growth in Antarctica appears to follow a typical, seasonal path, it is roughly two weeks behind in terms of absolute value.

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Iceberg D-15

Figure 2 shows a high-resolution Sentinel-1b SAR scene, complemented by high-resolution AMSR-2 sea-ice concentration data.

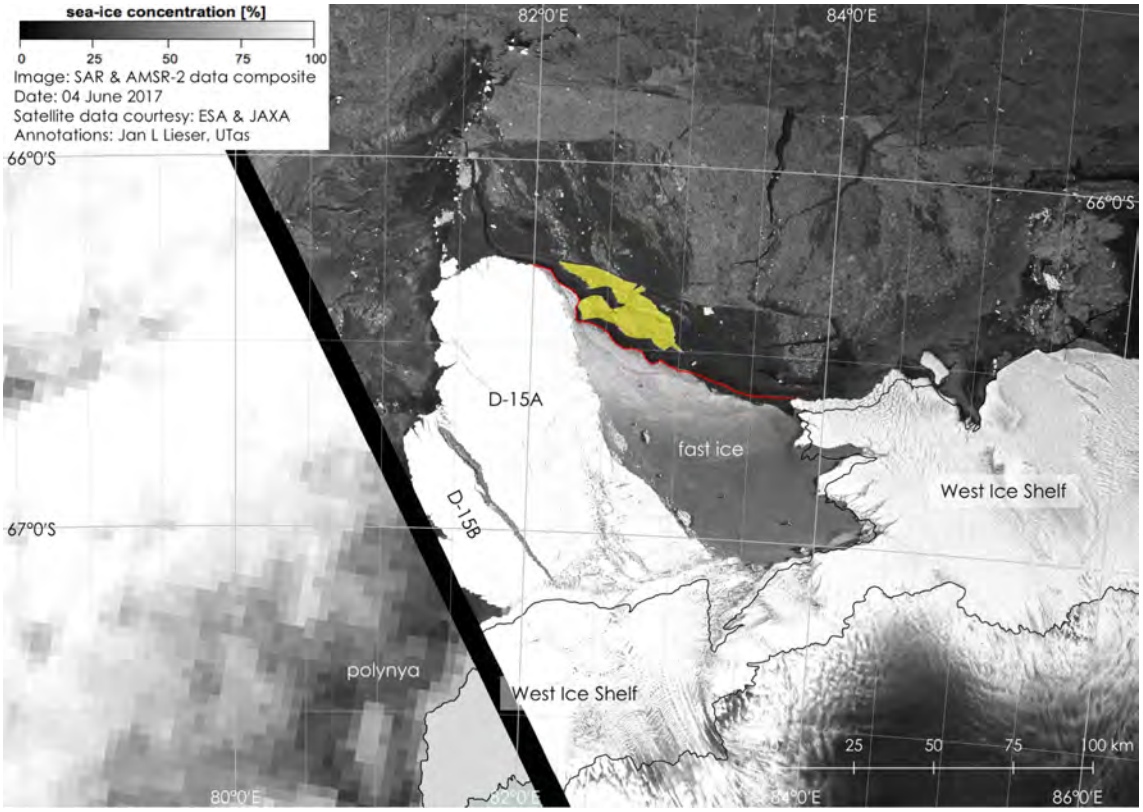

Figure 2: Sentinel-1b SAR acquired 04/06/2017 at 14:14 UT and provided by PolarView; complemented by sea-ice concentration acquired on 04/06/2017 and providede by Universität Hamburg.

East of iceberg D-15A, a large part (roughly 400 km^2, highlighted by the yellow shape in Figure 2) of old fast ice has broken off the body of fast ice, which is wedged between the West Ice Shelf and the iceberg. To the east from there, more and younger fast ice broke off during the same event. The new fast-ice edge in the region is approximated by the red line.

The rift between icebergs D-15A and D-15B is approaching 3 km width in the northern part.

Sea Ice Report #25.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/06/2017

Antarctica

Figure 1 shows the Antarctic sea-ice concentration anomaly for May 2017. The black line is the average sea-ice extent for May 2017 and the grey line the climatological sea-ice extent for May.

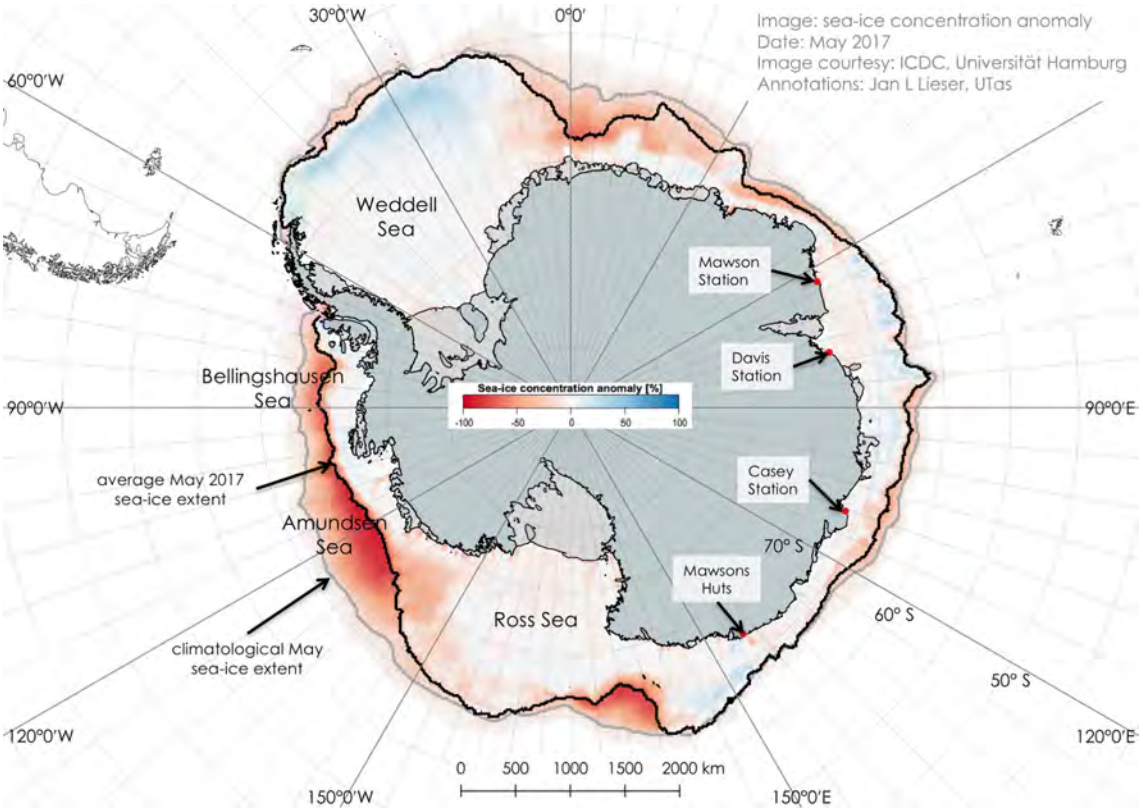

Figure 1: Sea-ice concentration anomaly of May 2017 provided by ICDC, Universität Hamburg.

Around Antarctica, the trend of negative sea-ice concentration anomalies continues in certain regions, which was already foreshadowed in the previous report (#24.1/2017). Amundsen Sea and western Ross Sea appear to be worst affected, followed by Bellingshausen Sea, while the eastern Weddell Sea shows a lesser degree of anomalously low (negative) sea-ice concentration. In East Antarctica a mixed signal of only slightly positive and negative deviations from the average is observed.

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Mawson Station

Figure 2 shows a high-resolution Sentinel-1a SAR scene off Mawson Coast and Mawson Station.

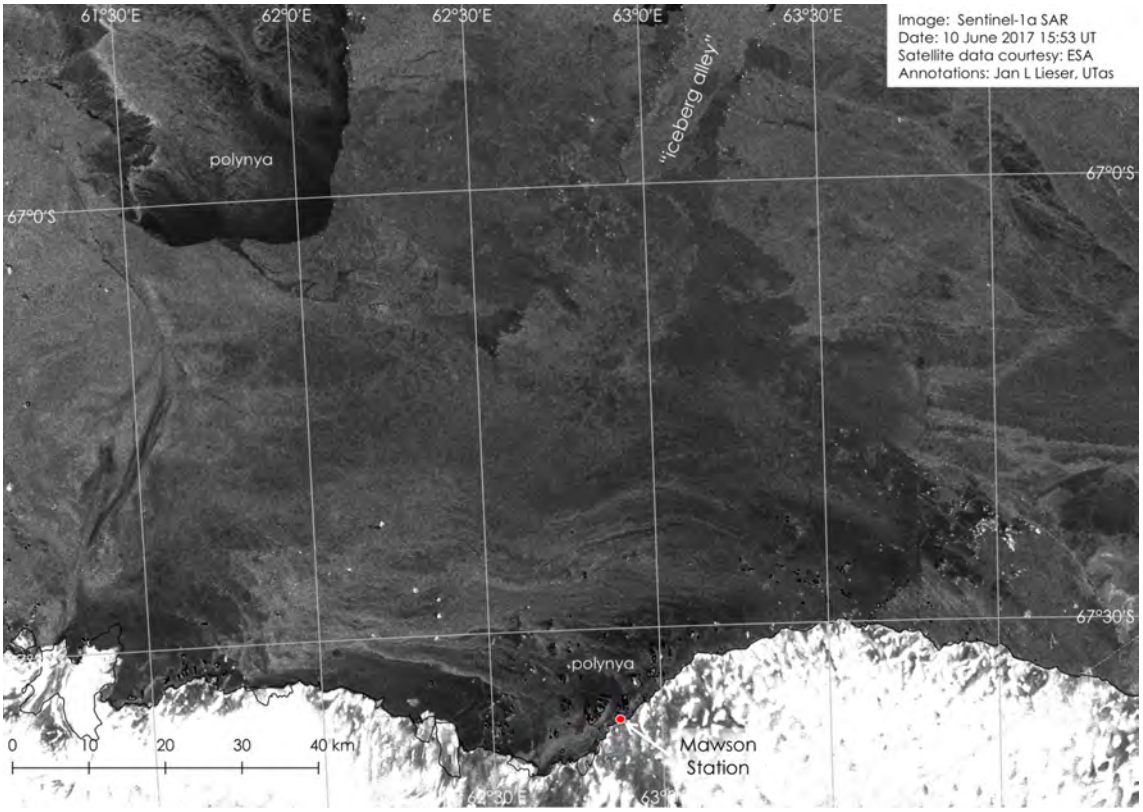

Figure 2: Sentinel-1a SAR scene acquired 10/06/2017 at 15:53 UT and provided by PolarView.

While the typical polynya northwest of the station is forming (currently roughly 40 nautical miles away), there is still some polynya-like activity closer to shore. Even though it is of high sea-ice concentration, the stripy signature of sea ice offshore Mawson Station indicates dynamic activity, which at this point in time can be interpreted as backfilling with newly forming sea ice.

Davis Station

Figure 3 shows a high-resolution Sentinel-1a SAR scene of the Vestfold Hills and Davis Station.

North of the hills, a mixture of different sea-ice types exists. A dashed, red line indicates a boundary between older fast ice (which has formed since the onset of winter) and newly forming fast ice. Further offshore, groups of icebergs help pinning new fast ice in place and polynya activity can be seen off the fast-ice edge.

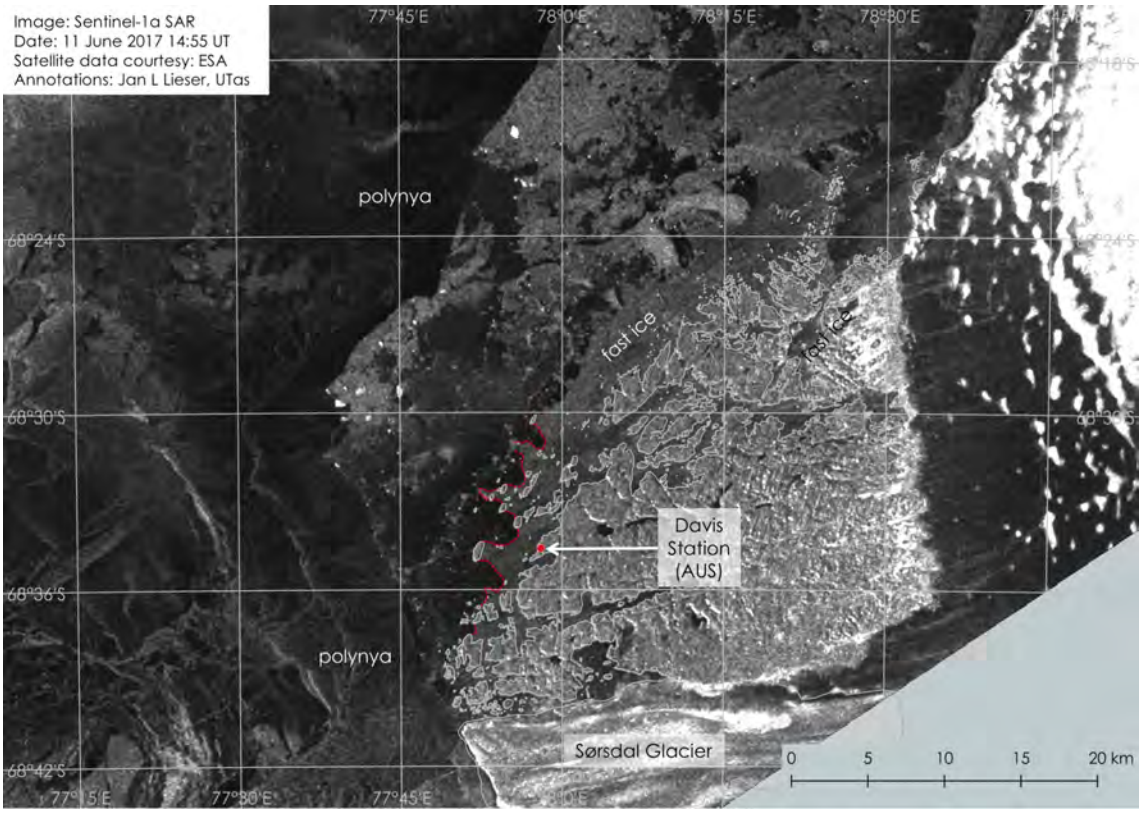

Figure 3: Sentinel-1a SAR scene acquired 11/06/2017 at 14:55 UT and provided by PolarView.

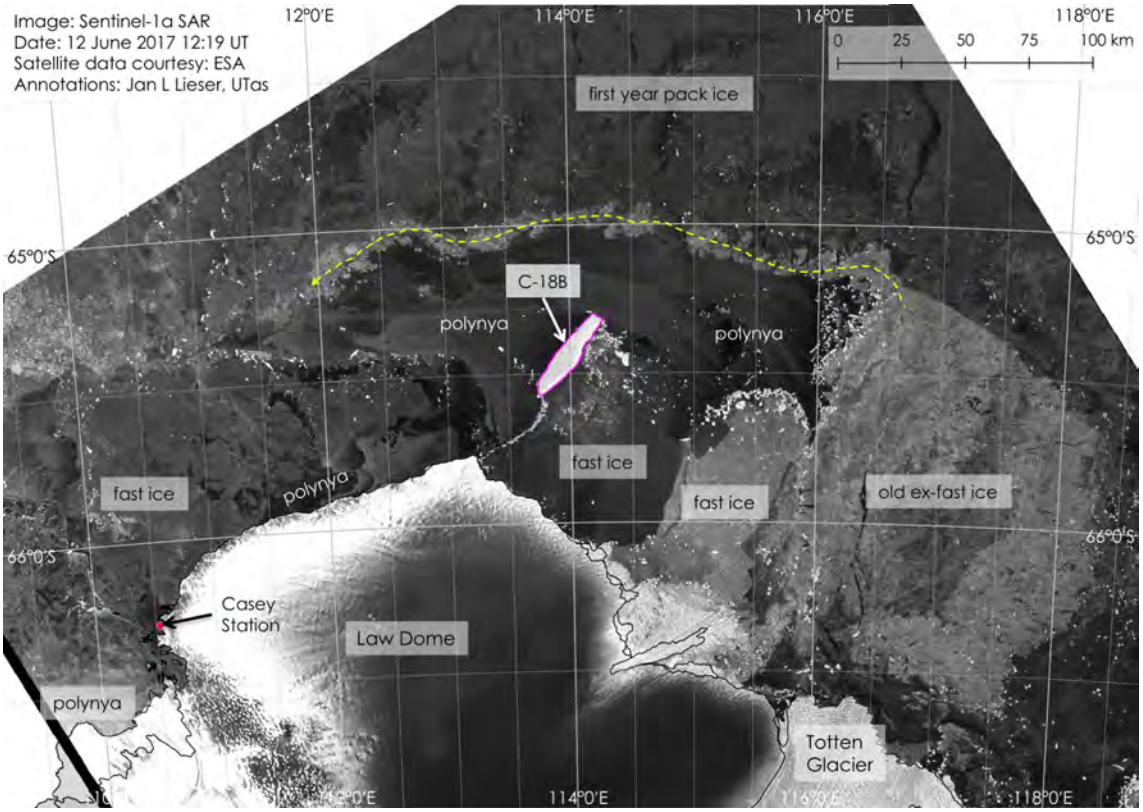

Figure 4: Sentinel-1a SAR scene acquired 12/06/2017 at 12:19 UT and provided by PolarView.

Budd Coast

Figure 4 shows a high-resolution Sentinel-1a SAR scene off Budd Coast and Law Dome.

North of Totten Glacier, old ex-fast ice is finding its way around the northern end of a group of grounded icebergs (at about 116° 30' E and 65° 10' S) and can be traced westward by its high RADAR reflectivity (dashed, yellow arrow) while it follows the general sea-ice drift along the continental slope.

Sea Ice Report #26.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/06/2017

At the June solstice, both the Arctic Ocean and the Southern Ocean are experiencing almost unprecedented low daily sea-ice extent and area values. Globally (both the Arctic and Antarctica combined), sea-ice extent and area are roughly 2×10^6 km^2 below their respective normal values for this time of year.

Antarctica

Figure 1 shows the Antarctic sea-ice concentration chart for Midwinter 2017. The yellow line marks the long-term median sea-ice extent for June.

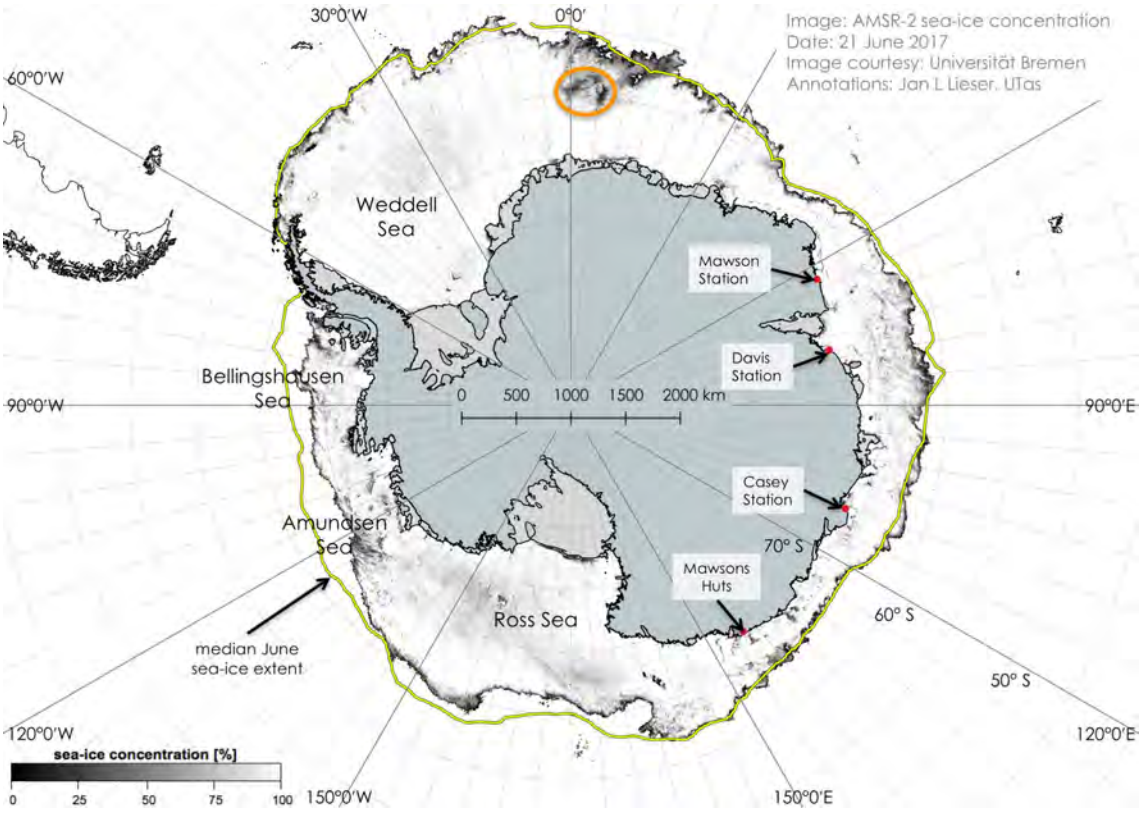

Figure 1: AMSR-2 sea-ice concentration acquired 21/062017 and provided by PolarView.

The figure highlights sea-ice extent much below (south of) the median in the Bellingshausen Sea, Amundsen Sea and Ross Sea, while the Weddell Sea and most of East Antarctica show at least close to median extent with the exception of the region around Maud Rise oceanic plateau

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(marked by an orange circle). The so-called Maud Rise polynya was effectively present since the beginning of June but will only be recognised as a polynya since a northern sea-ice bridge surrounded open water at the location east of Maud Rise (since 09/06/2017). At this time of year, this polynya presents itself only occasionally but a precursor became apparent already in the May sea-ice extent anomaly in the region (see Sea Ice Report #25.1/2017). The sea-ice concentration chart acquired yesterday (Figure 1) shows still low ice concentration, but no more open water.

D'Urville Sea

Figure 2 shows a MODIS night-time ice temperature composite (combining data from both TERRA and AQUA spacecraft) of D'Urville Sea.

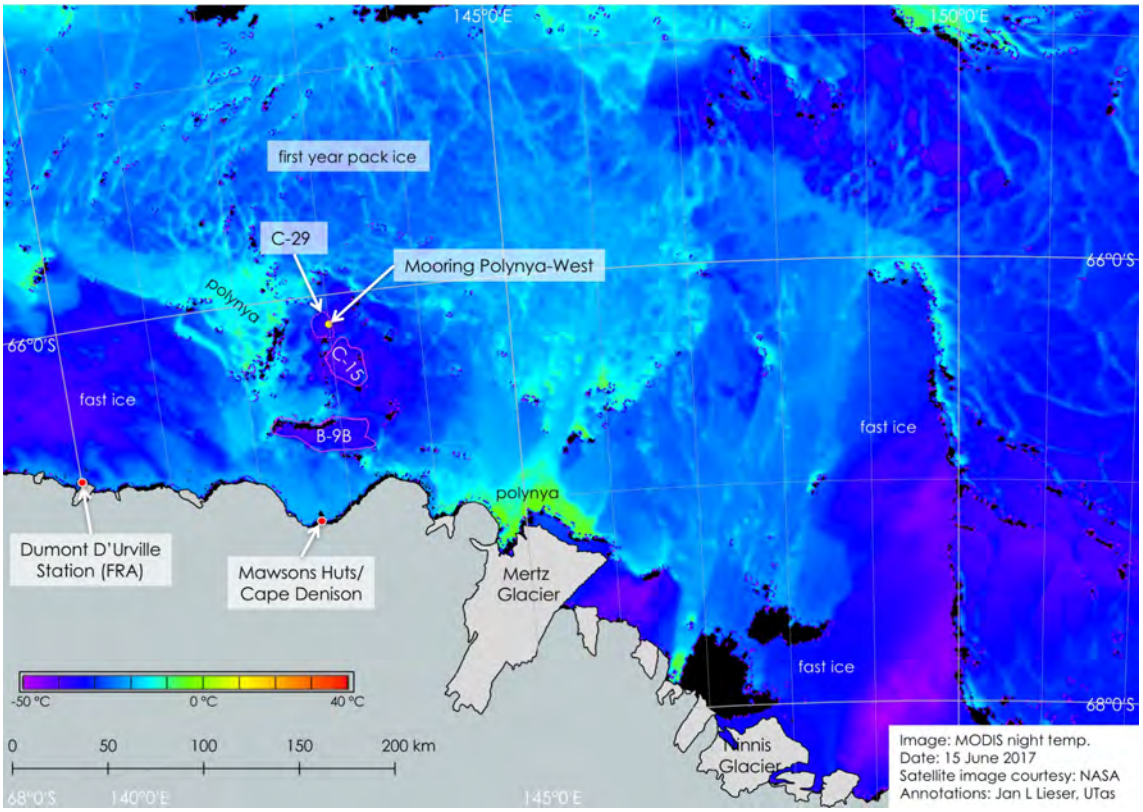

Figure 2: TERRA and AQUA MODIS night-time ice temperature composite acquired 15/06/2017 and provided by NASA.

During times of darkness, cloud-free scenes of the ice surface allow for thermal imaging. In the above figure, thin ice and open water shows in green (close to 0 °C), including cracks and leads in the pack ice. Icebergs and thick, snow-covered fast ice can be distinguished by their low surface temperature. The respective position and orientation of icebergs B-9B and C-15 are marked by their pink outline. Iceberg C-29 could not be positively identified and its last known position (on 02/05/2017) is marked by only a dashed, pink line.

Sea Ice Report #27.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

26/06/2017

Mawson Coast

Figure 1 shows two high-resolution SAR scenes off Mawson Coast.

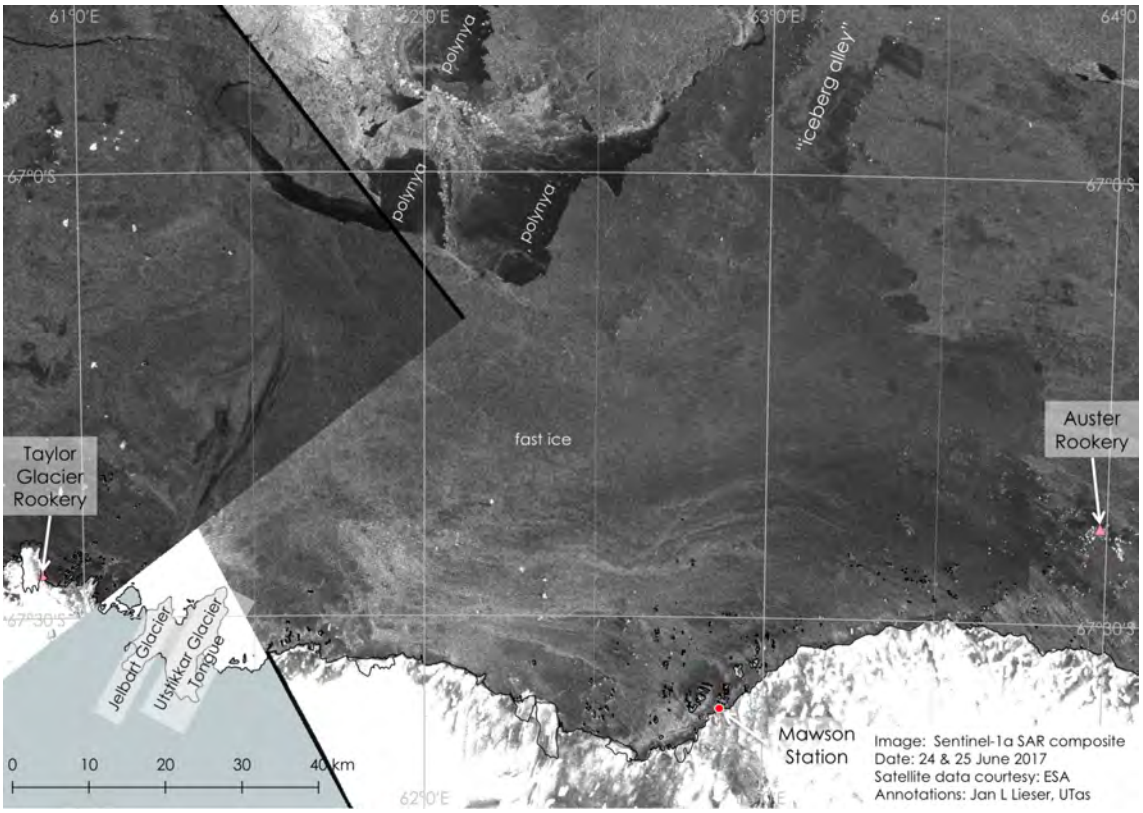

Figure 1: Sentinel-1a SAR scenes; acquired 24/06/2017 15:37 UT and 25/06/2017 16:18 UT (western overlay); both provided by PolarView.

Fast ice extends offshore. Different shading of the fast-ice signature is a result of different formation processes at different times. West of Mawson Station, the bright banding appeared during backfilling of the polynya with new sea ice in late autumn. North of Utstikkar Glacier Tongue, dark banding indicates a different formation regime of the local fast ice, which is also manifested in the different orientation of the banding.

Northwest of Mawson Station, the polynya is roughly 33 nautical miles away.

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Ingrid Christensen Coast

Figure 2 shows a high-resolution SAR scene offshore Ingrid Christensen Coast, from the Vestfold Hills (Davis Station) to the West Ice Shelf.

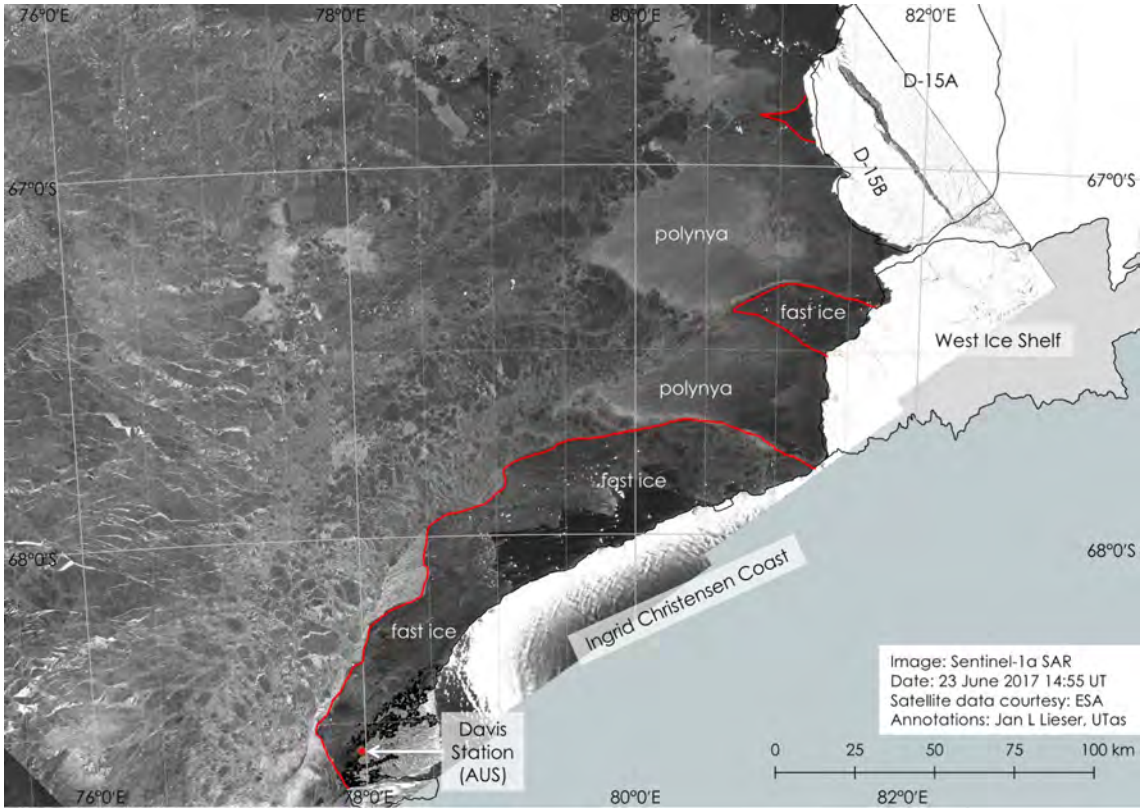

Figure 2: Sentinel-1a SAR scene acquired 23/06/2017 at 14:55 UT and provided by PolarView.

Fast ice has formed along the coast. West of the West Ice Shelf and iceberg D-15B, polynyas of various extent are active.

The rift between icebergs D-15A and D-15B exceeds now 3 km width in its northern part.

Law Dome

Figure 3 shows a high-resolution SAR scene offshore Law Dome.

The northern flank of Law Dome is enclosed by fast ice, which is pinned in place by numerous icebergs grounded offshore.

Episodic northward movement of the mass of ex-fast ice northeast of Totten Glacier sheds rough, old sea ice (bright grey shading) into the westward sea-ice drift north of the fast ice (marked with yellow arrows in Figure 3; see also Sea Ice Report #25.1/2017). The most recent event appears to have chiseled off floes from the ex-fast ice mass (marked by the dotted orange outline in the figure).

Such northward movement of the ex-fast ice mass results also in shear zones and cracks where the ex-fast ice neighbours fast ice northeast of Law Dome (indicated by dashed, red lines in the figure, which are roughly north-south oriented).

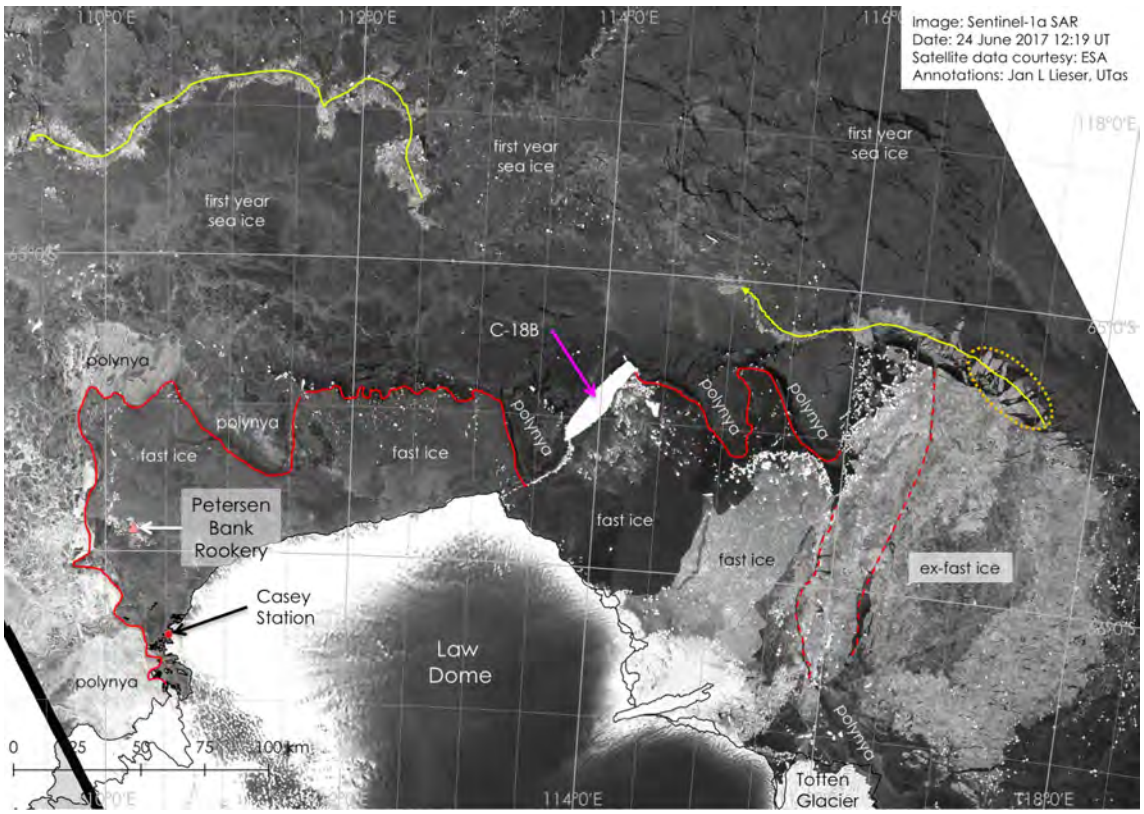

Figure 3: Sentinel-1a SAR scene acquired 24/06/2017 at 12:19 UT and provided by PolarView.

Sea Ice Report #28.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

04/07/2017

Mawson Coast

Figure 1 shows a high-resolution SAR scene off western Mawson Coast.

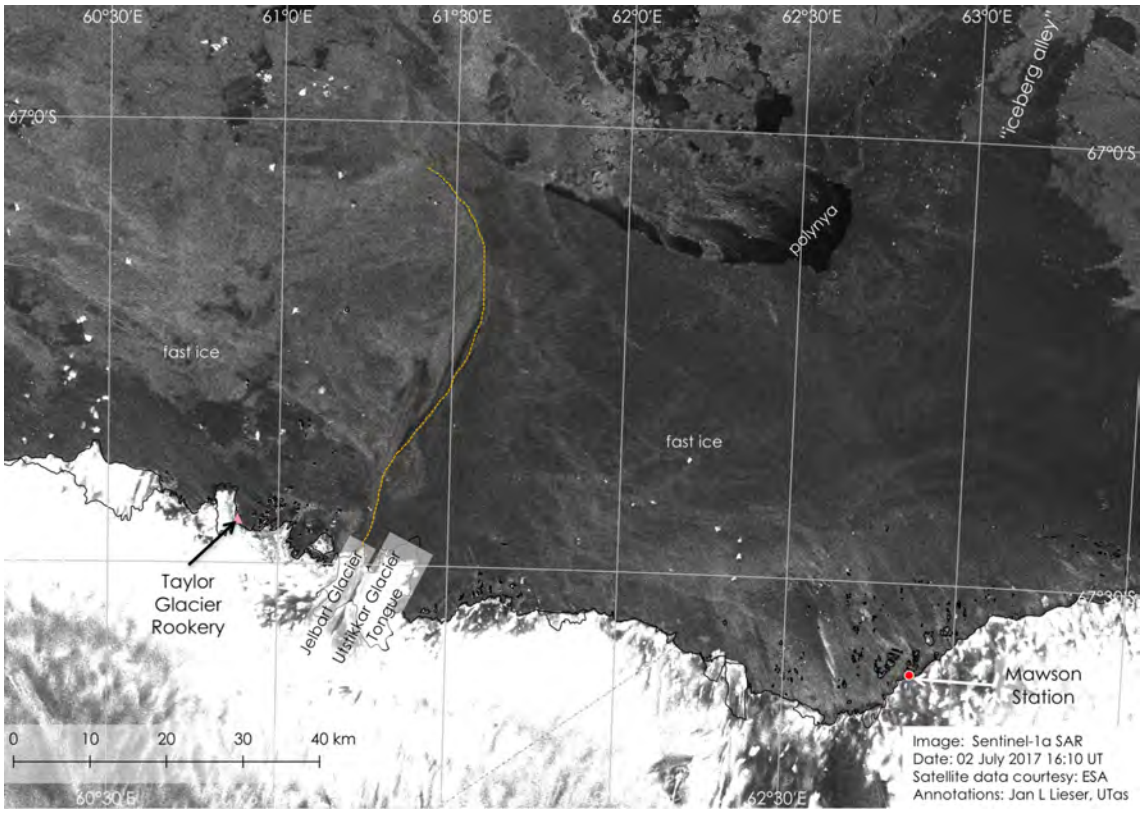

Figure 1: Sentinel-1a SAR scene; acquired 02/07/2017 16:10 UT and provided by PolarView.

Fast-ice conditions appear to not have changed significantly during the past week (since Sea Ice Report #27.1/2017). North of Jelbart Glacier, a change in banding direction indicates a regime shift during the formation process of the fast ice. The boundary of this shift is indicated by the dashed, orange line in Figure 1.

Northwest of Mawson Station, the polynya is less than 30 nautical miles away.

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Sabrina Coast

Figure 2 shows a high-resolution SAR scene offshore Sabrina Coast.

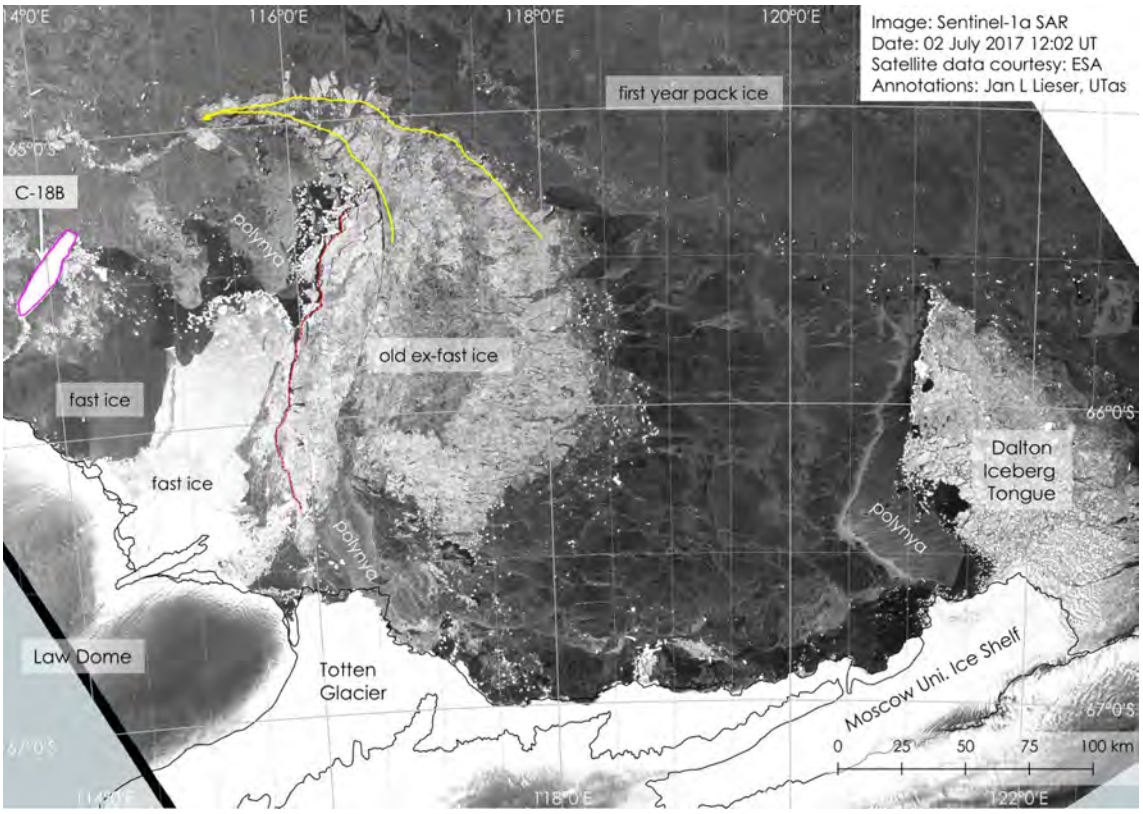

Figure 2: Sentinel-1a SAR scene; acquired 02/07/2017 12:02 UT and provided by PolarView.

Continued, northward movement of the mass of ex-fast ice north of Totten Glacier sheds rough, old sea ice (bright grey shading) into the westward sea-ice drift north of the fast ice (as indicated by yellow arrows in Figure 2; see also Sea Ice Report #27.1/2017). Additionally, on 03/07/2017, a crack between the ex-fast ice and the remaining fast ice (marked by the dashed, red line in the figure) has widened sufficiently enough to be picked up by high-resolution (3.125 km) passive microwave sea-ice concentration algorithm (not shown).

Directly north of Totten Glacier, the polynya is frozen over by thin sea ice.

D'Urville Sea

Figure 3 shows a high-resolution sea-ice concentration chart of D'Urville Sea. Figure 4 shows the same geographical frame two days later as seen by the VIIRS day/night panchromatic band (750 m horizontal resolution). While VIIRS data are affected by clouds, thin sea ice and open water appears dark in the image and ice surfaces in shades of grey.

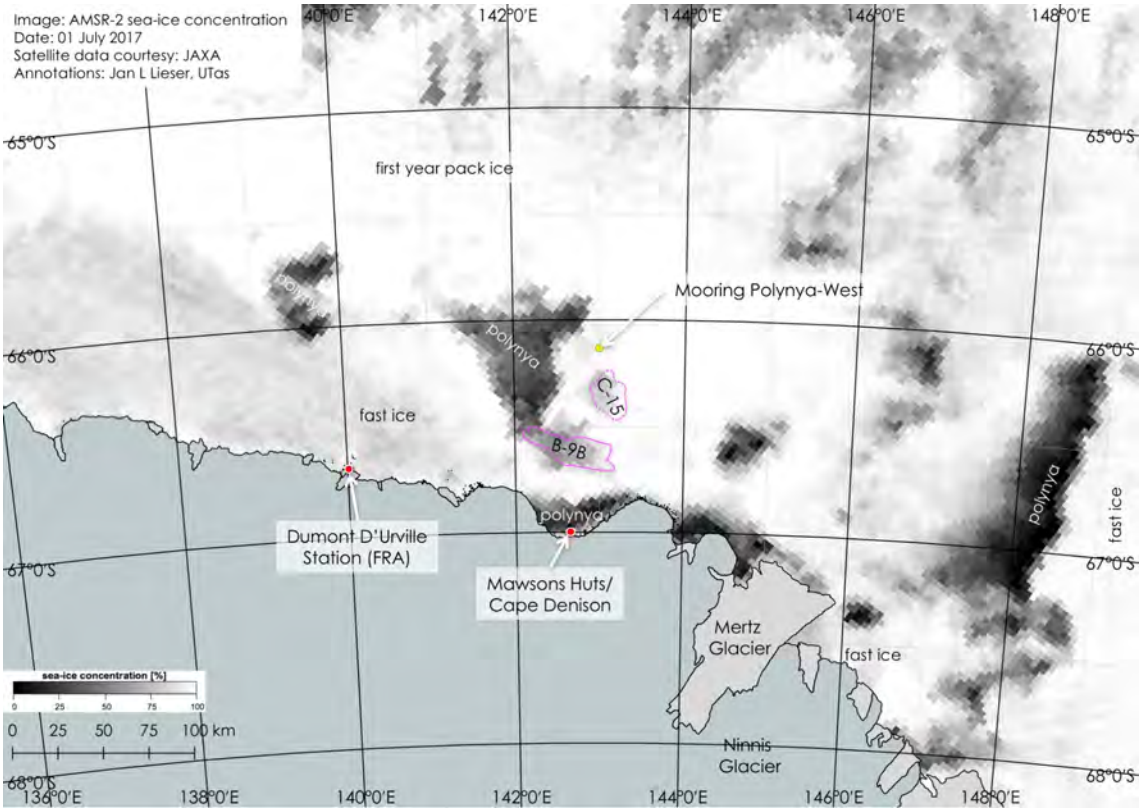

Figure 3: Sea-ice concentration chart, acquired 01/07/2017 and provided by ICDC.

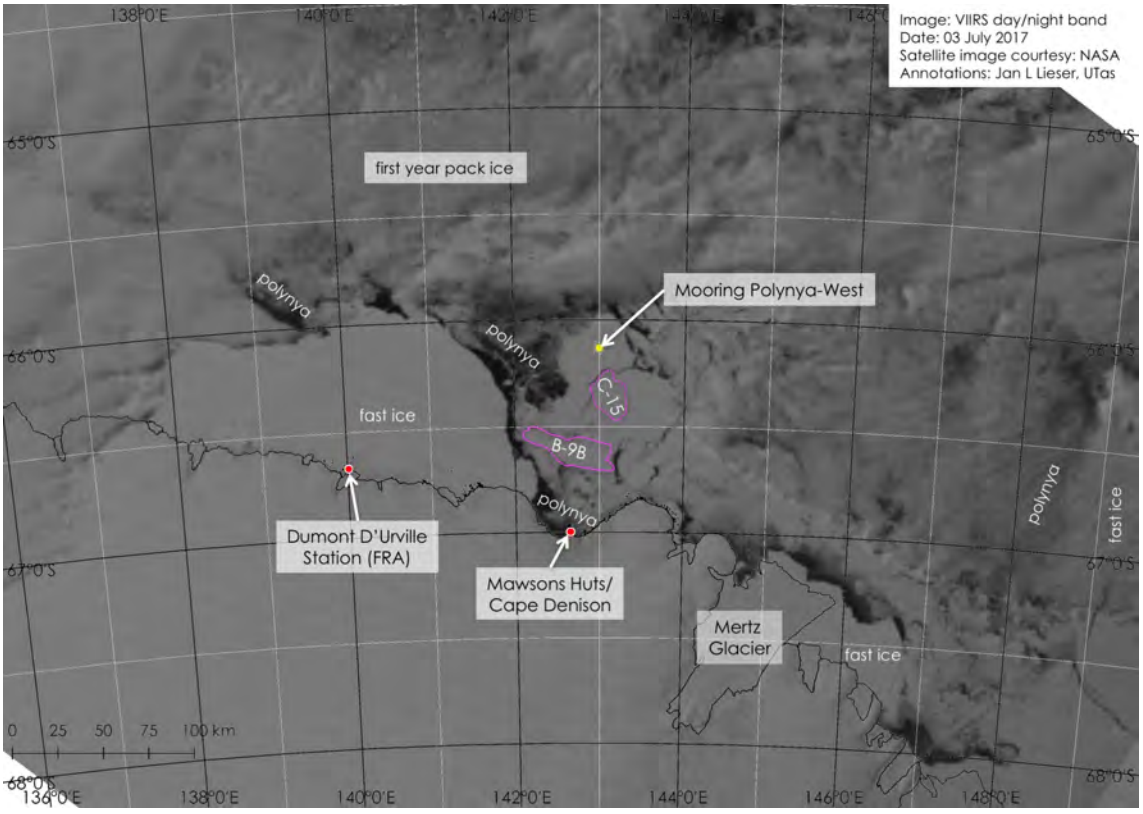

Figure 4: Suomi-NPP VIIRS panchromatic image (VIS-NIR), acquired 03/07/2017 and provided by NASA.

Icebergs B-9B and C-15 are marked in the figures, but the location of iceberg C-29 is not discernible.

Off Cape Denison, a polynya is developing since 29/06/2017 and clearly visible in the high-resolution sea-ice concentration data on 01/07/2017 (Figure 3). The region north of Commonwealth Bay/Cape Denison appears to be fairly dynamic, which can be seen by the different shape of the Cape Denison polynya on 03/07/2017 (Figure 4).

Sea Ice Report #29.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

10/07/2017

Mawson Coast

Figure 1 shows a high-resolution SAR scene of eastern Mawson Coast.

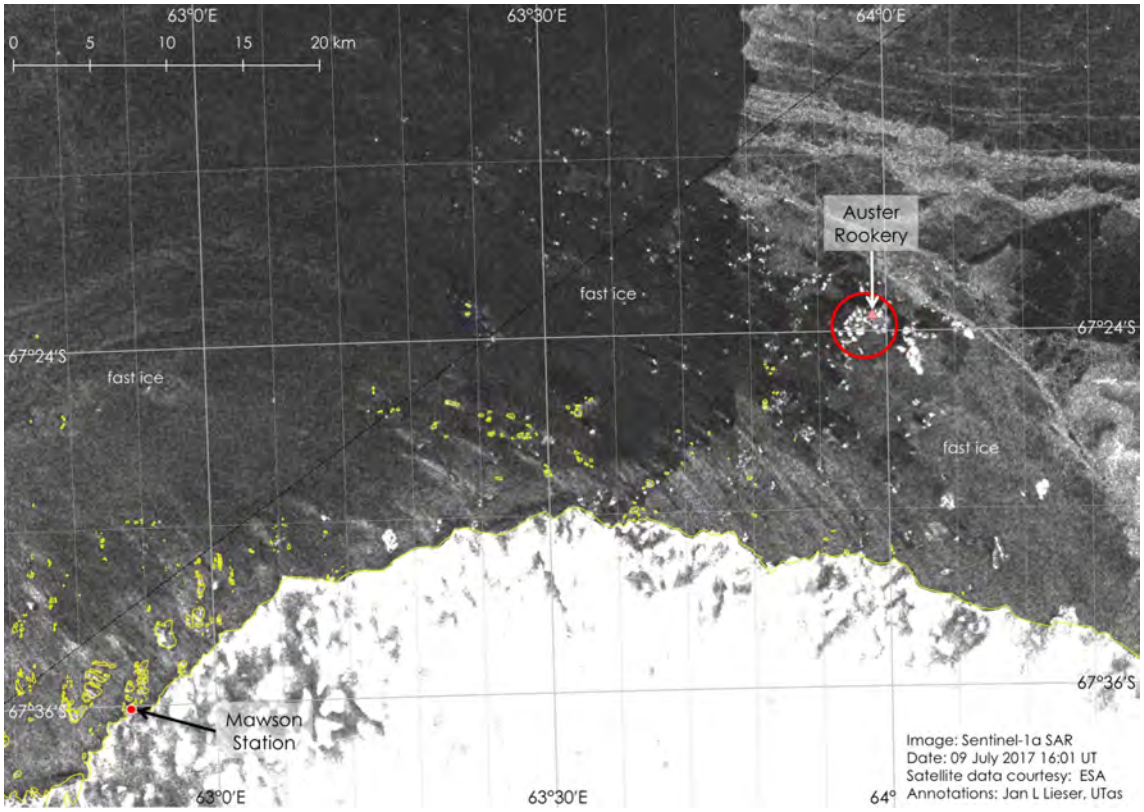

Figure 1: Sentinel-1a SAR scene; acquired 09/07/2017 at 16:01 UT and provided by PolarView. (A thin black diagonal line is an image artefact and the result of stitching two tiles.)

Various types of fast ice are seen in the scene, which formed at different times and under different conditions. Auster rookery is presumed to be close to a group of icebergs (red circle) and surrounded by fast ice of different age (note: all present fast ice only formed this season).

Figure 2 shows a pan-chromatic overview offshore Mawson Coast. A black-yellow frame is approximating the position of Figure 1. Bright streak-like arcs are Aurora Australis in the upper atmosphere, whereas parallel banding is a scanning artefact. Northwest of Mawson Station, a polynya is roughly 29 nautical miles away (orange arrow).

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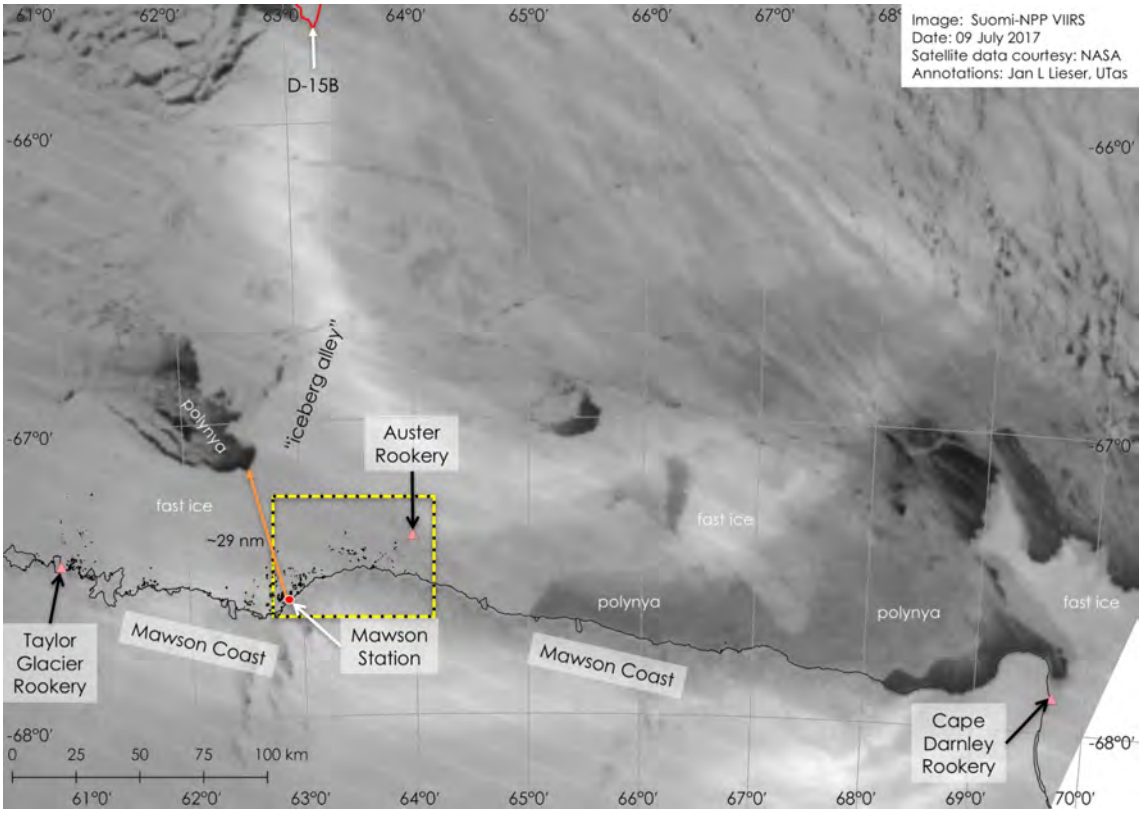

Figure 2: Suomi-NPP VIIRS panchromatic image (VIS-NIR), acquired 09/07/2017 and provided by NASA.

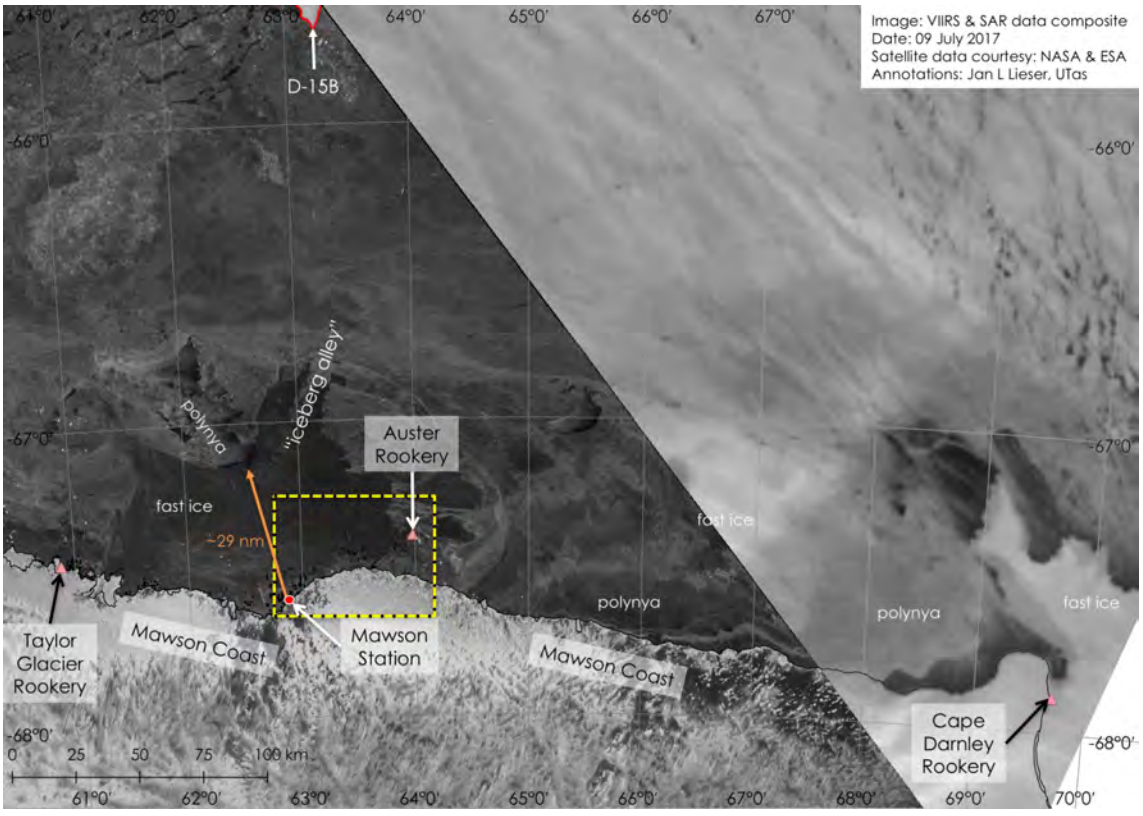

Figure 3: Mawson Coast composite image of data shown in figures 1 and 2.

Sea Ice Report #29.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

11/07/2017

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for June 2017 for Antarctica.

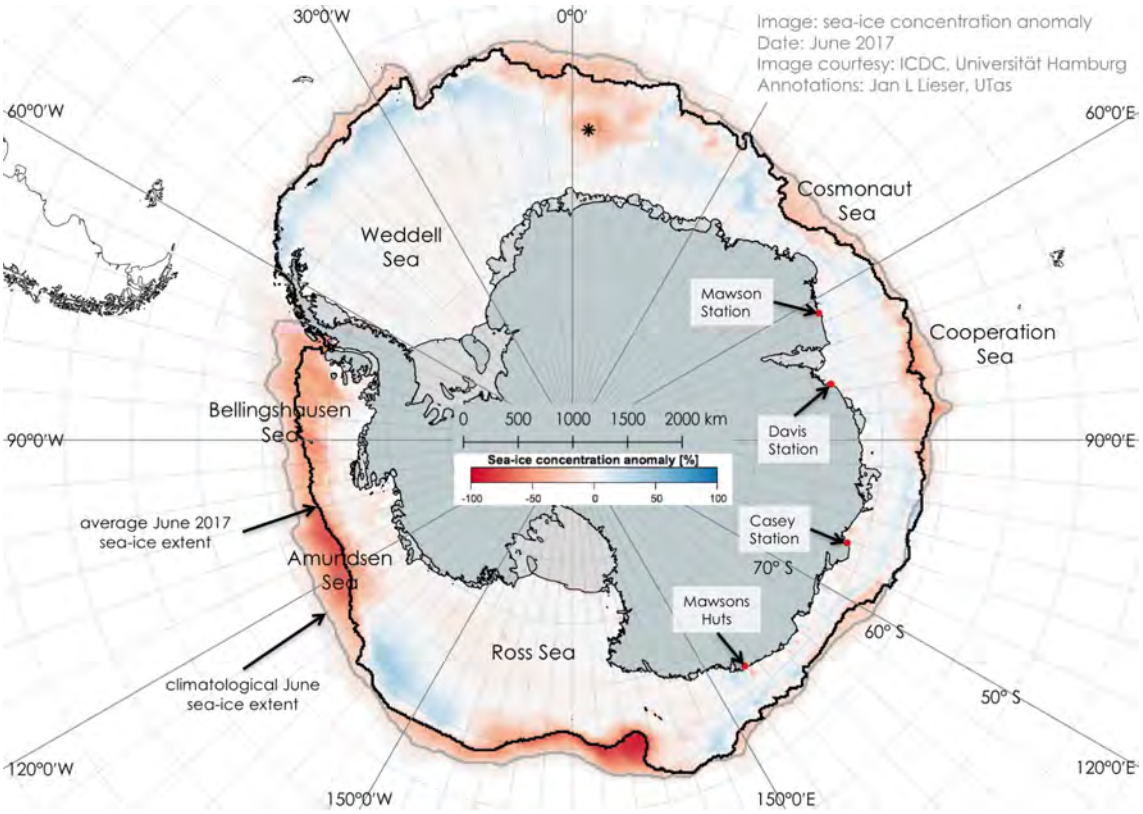

Figure 1: Sea-ice concentration anomaly of June 2017 provided by ICDC, Universität Hamburg

In June 2017, the largely negative sea-ice concentration trend continued around Antarctica. Particularly, the Amundsen Sea and western Ross Sea show strong negative anomalies, but also Bellingshausen Sea and the region of the oceanic plateau Maud Rise (marked by a star east of Greenwich Meridian), which was the locale of the so-called Maud Rise polynya (see Sea Ice Report #26.1/2017).
Cosmonaut Sea and Cooperation Sea, as well as western Weddell Sea, show a lesser degree of negative anomalies, while between 90° E and 150° E, sea-ice extent and concentration are largely within average ranges.

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Sea Ice Report #29.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

14/07/2017

Sabrina Coast

Figure 1 shows a high-resolution SAR scene off Law Dome, Totten Glacier and the Moscow University Ice Shelf.

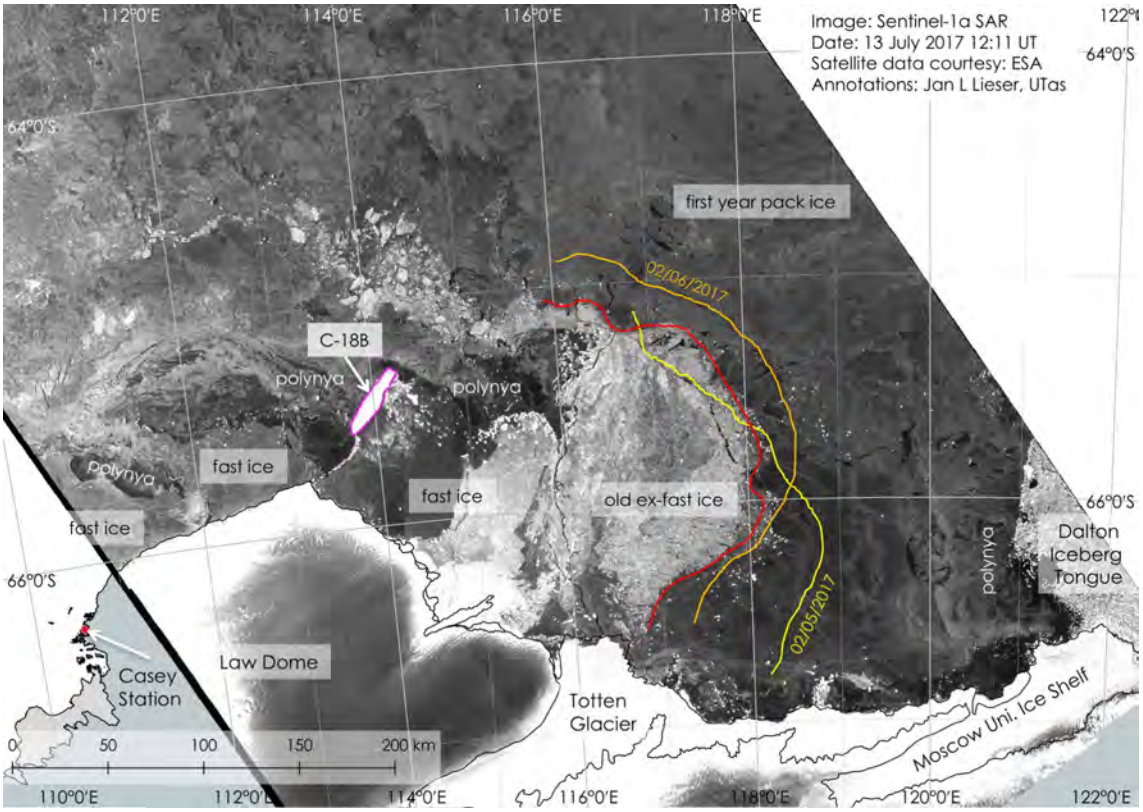

Figure 1: Sentinel-1a SAR scene acquired 13/07/2017 at 12:11 UT and provided by PolarView

The episodic discharge of old, deformed ex-fast ice continues in the region (see sea-ice reports #25.1/2017, #27.1/2017 and #28.1/2017). Roughly between 113° E and 116° E, sea-ice floes of old ex-fast ice can be seen north of iceberg C-18B.
Coloured lines (yellow: 02/05/2017; orange: 02/06/2017 and red: current) indicate the location of the boundary between old ex-fast ice and newly formed sea ice, which originates out of the polynya west of the Dalton Iceberg Tongue. The gradual westward contraction can be seen and is resulting in a reduction of areal coverage of old, ex-fast ice by more than 4500 km^2 in the region.

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D'Urville Sea

Figure 2 shows a high-resolution SAR scene between Dumont D'Urville Station and the Mertz Glacier. The positions of three large icebergs on 01/05/2017 are indicated by dashed, pink outlines.

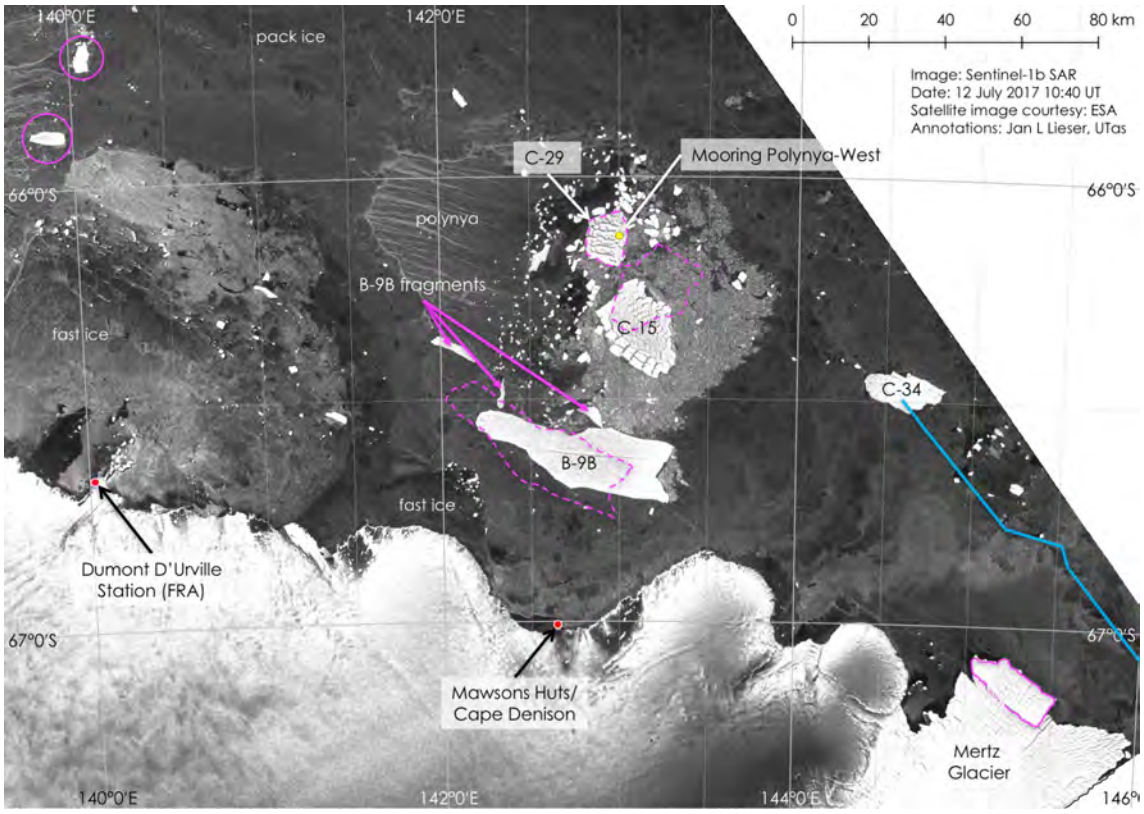

Figure 2: Sentinel-1b SAR scene acquired 13/07/2017 at 10:40 UT and provided by PolarView

Iceberg B-9B has shed a few fragments (approximately 30 km^2 in total) and moved circa 10 km in easterly direction. Iceberg C-15 remains constantly on the move between icebergs B-09B and C-29, while iceberg C-29 has not moved at all. During the previous few weeks, iceberg C-34 has travelled into the region from the southeast. It has been tracked back to the western side of Ninnis Glacier (blue line).

Sea Ice Report #30.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/07/2017

Davis Station

Figure 1 shows a high-resolution SAR scene of the Vestfold Hill complemented (in the northeast corner) by a Sentinel-1a SAR scene acquired five days earlier (15/07/2017 15:11 UT). The fast-ice edge is indicated by the red line, while the dashed, orange line approximates the fast-ice edge on 15/07/2017.

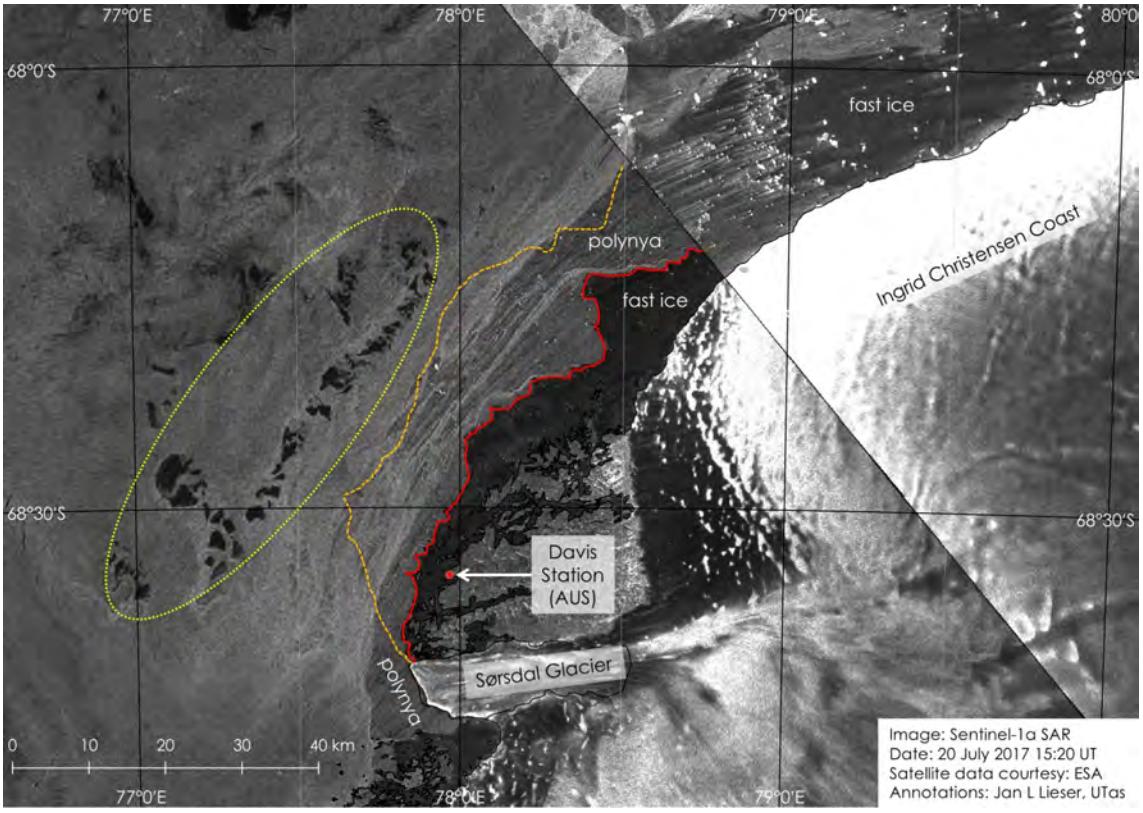

Figure 1: Sentinel-1a SAR scene, acquired 20/07/2017 at 15:20 UT and provided by PolarView.

Since 15/07/2017, more than 650 km^2 of fast ice has broken off in the area, which brings the current fast-edge in the vicinity of Davis Station as close as Gardner Island.

In Figure 1, broken pieces of ex-fast ice can be identified as black shapes embedded in a matrix of new ice (see yellow ellipse).

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Sabrina Coast

Figures 2, 3 and 4 show the same geographical frame off Sabrina Coast, as seen by AMSR-2, VIIRS and SAR, respectively. The fast-ice edge is indicated by a red line.

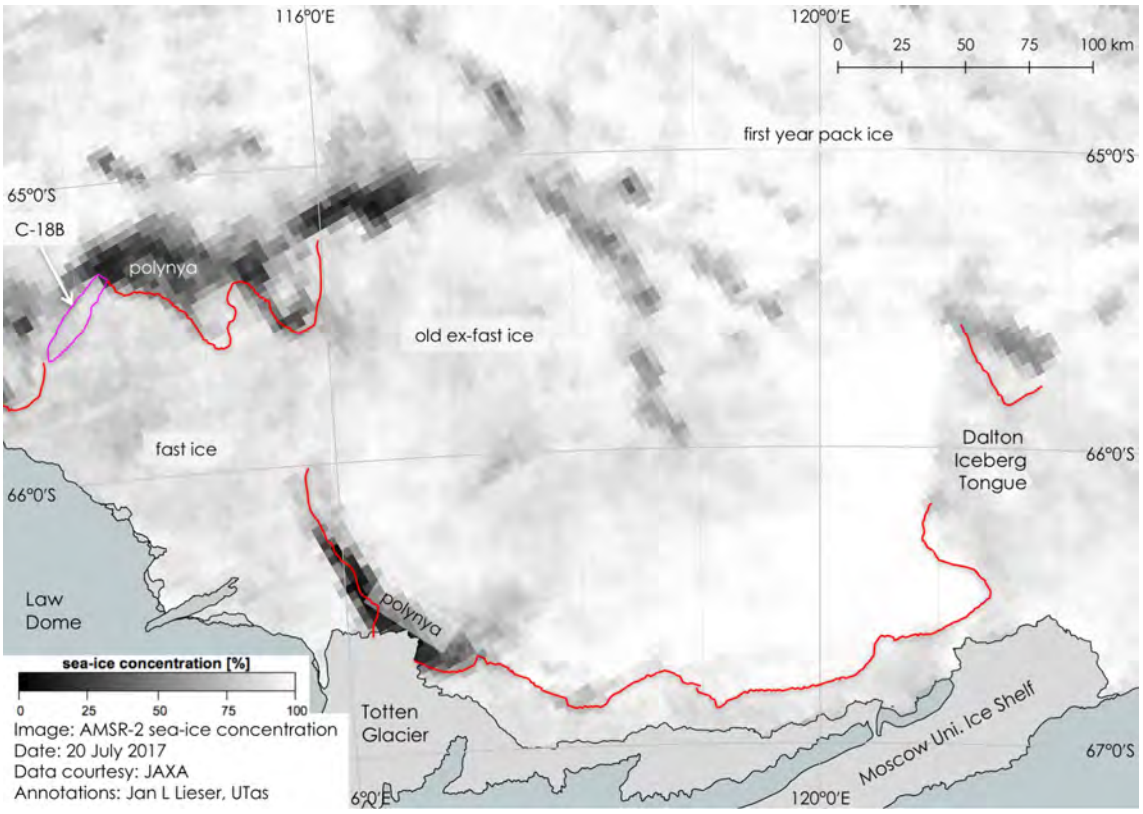

Figure 2: Sea-ice concentration; acquired 20/07/2017 and provided by ICDC, Universität Hamburg.

West of the Danton Iceberg Tongue, the polynya is frozen over. North of Totten Glacier, ex-fast ice appears still rather dynamic, when northward movement of this patch of sea ice discharges old, deformed sea-ice floes into the westward drift of predominantly first-year pack ice north of 65° S.

East of iceberg C-18B and off Totten Glacier, polynyas are active. Wide cracks covered by only thin ice can be seen in both, the VIIRS (500 m resolution) and SAR (30 m resolution) data.

North of the Dalton Iceberg Tongue, a large piece of fast ice (roughly 250 km^2) has broken off.

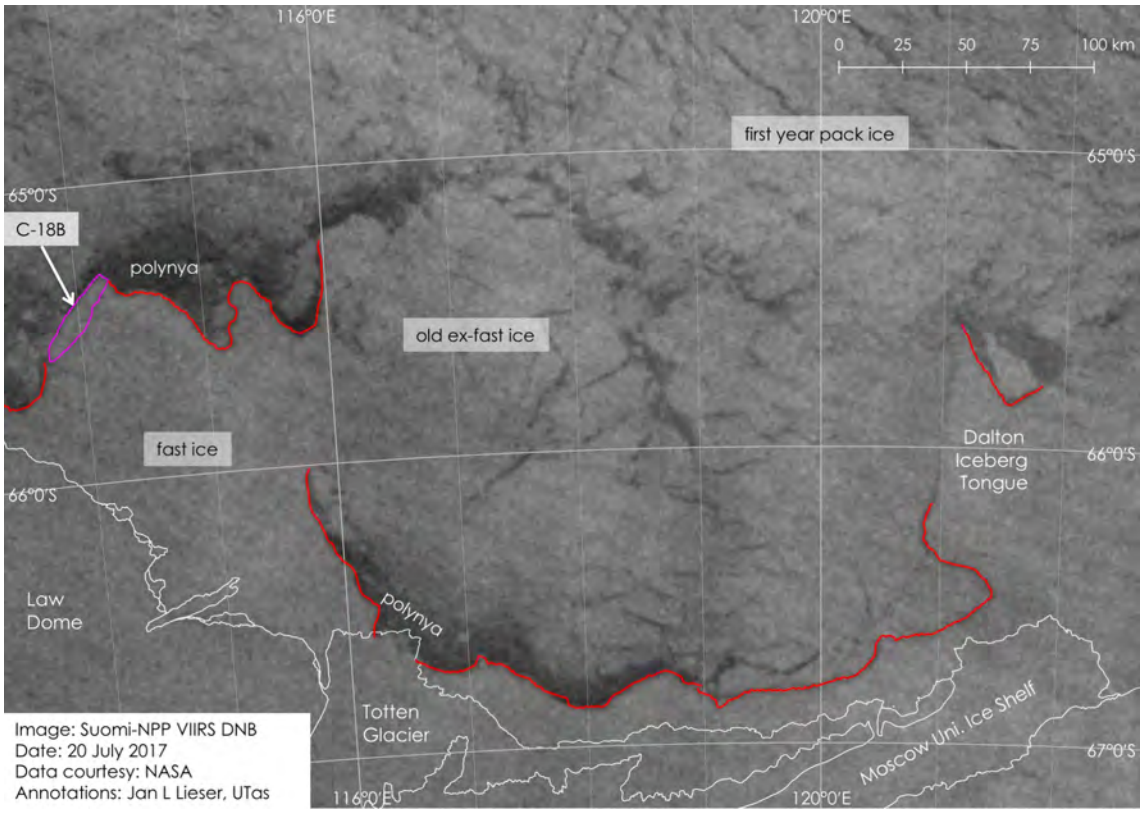

Figure 3: Suomi-NPP VIIRS panchromatic image (day-night band, DNB), acquired 20/07/2017 and provided by NASA.

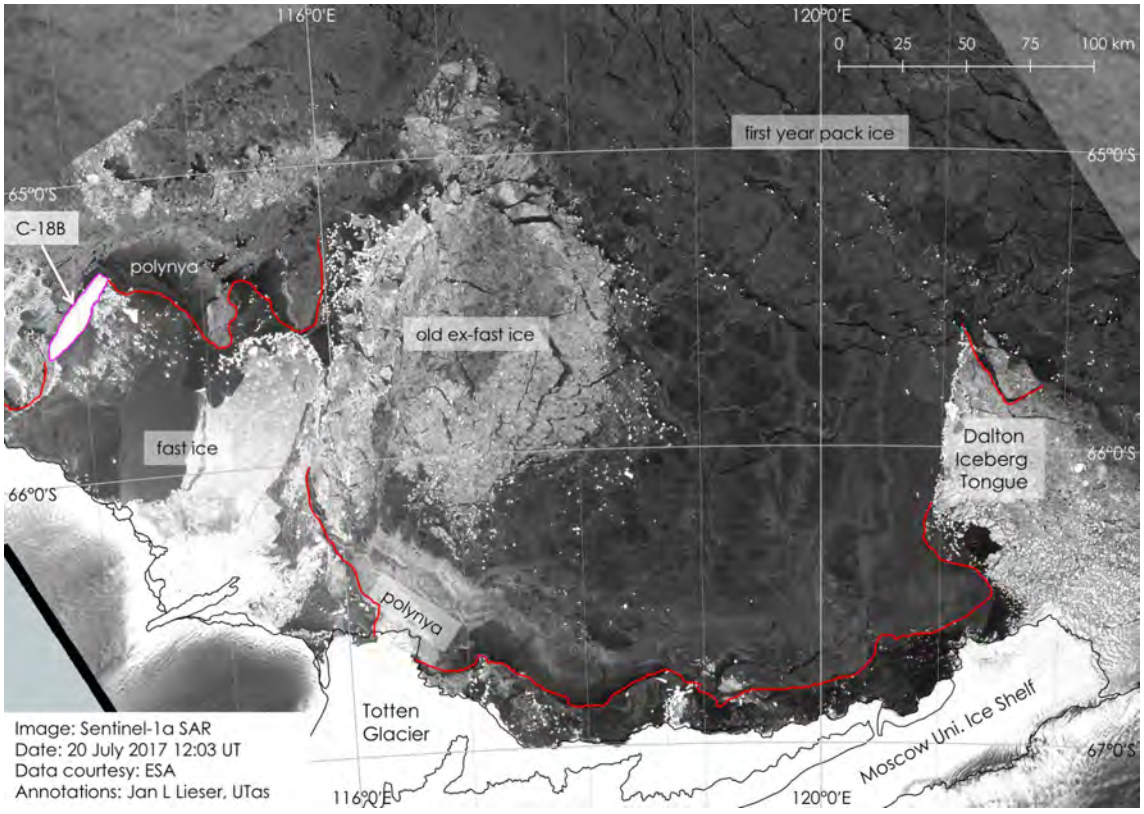

Figure 4: Sentinel-1a SAR scene, acquired 20/07/2017 at 12:03 UT and provided by PolarView (background: Figure 3).

Sea Ice Report #31.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/07/2017

Sabrina Coast

Figures 1, 2 and 3 show the same geographical frame off Sabrina Coast, as seen by AMSR-2, VIIRS and SAR, respectively. The fast-ice edge is indicated by a red line where positive identification by SAR was possible.

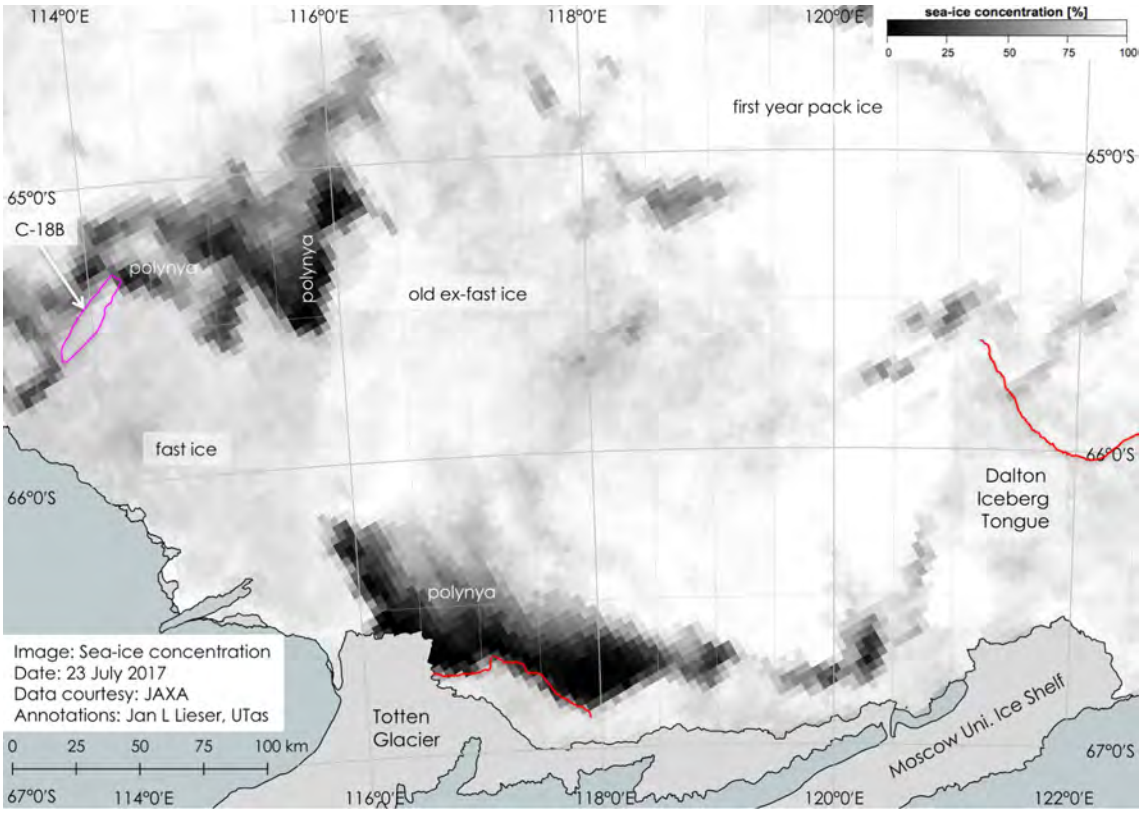

Figure 1: Sea-ice concentration; acquired 23/07/2017 and provided by ICDC, Universität Hamburg.

Following persistent southerly winds, a large polynya (of more than 7500 km^2) is now off Totten Glacier. Since 20/07/2017, the southern edge of the ex-fast ice north of Totten Glacier has moved approximately 50 km northward (on average 700 m/h or 0.4 knot; see yellow arrow in Figure 3 tracking a characteristic ice floe and compare Figure 4 of Sea Ice Report #30.1/2017).

North of the Dalton Iceberg Tongue, another large piece of fast ice (roughly 1000 km^2) has broken off.

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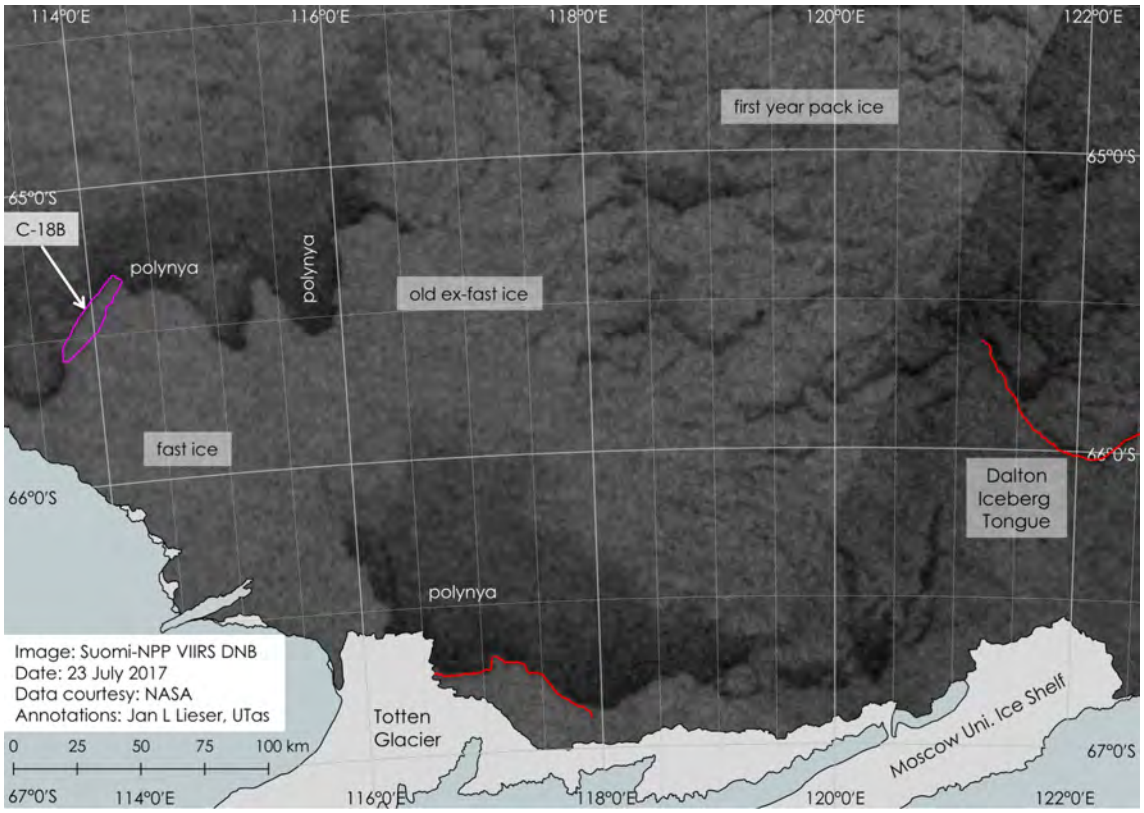

Figure 2: Suomi-NPP VIIRS panchromatic image (day-night band, DNB), acquired 23/07/2017 and provided by NASA.

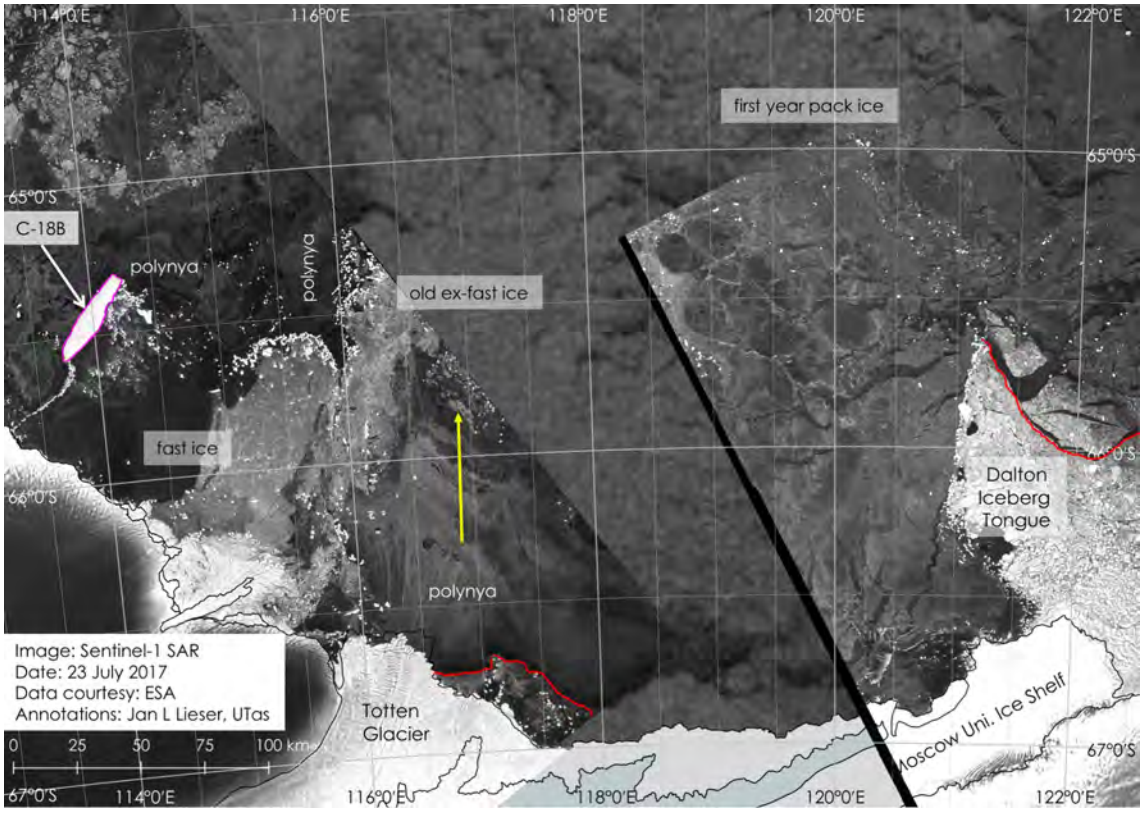

Figure 3: Sentinel-1 SAR scenes, western part acquired 23/07/2017 12:27 UT (Sentinel-1a), eastern part acquired 23/07/2017 11:37 UT (Sentinel-1b) and both provided by PolarView (background: Figure 2).

Iceberg A-68

Figure 4 shows a high-resolution SAR scene of iceberg A-68, which broke away from the Larsen-C Ice Shelf in western Weddell Sea on 12/07/2017.

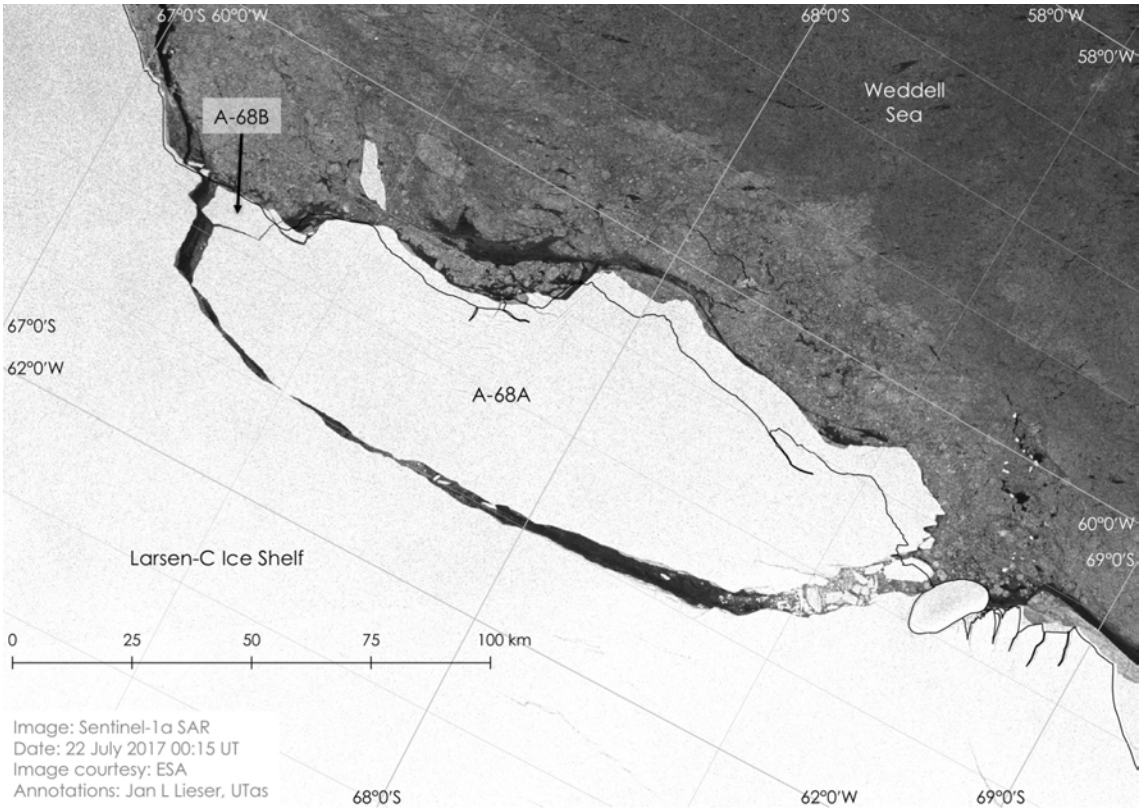

Figure 4: Sentinel-1a SAR; acquired 22/07/2017 at 00:15 UT and provided by PolarView.

Already now, it has spawned another iceberg, A-68B, and the remaining (still very large) piece is now consequently called A-68A. The new fragment is roughly 13 km by 7 km (91 km^2) in surface area.

Consecutive SAR scenes from 21/07/2017 07:38 UT and 22/07/2017 00:15 UT (the latter shown in Figure 4) reveal a 3.3 km southward movement of both new icebergs (during 17 hours).

Sea Ice Report #31.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

27/07/2017

Mawson Coast

Figure 1 shows a very high-resolution SAR scene (interferometric wide swath: 5 m by 20 m) of Mawson Coast complemented by high-resolution SAR (extra wide swath: 20 m by 40 m) in the northeastern corner.

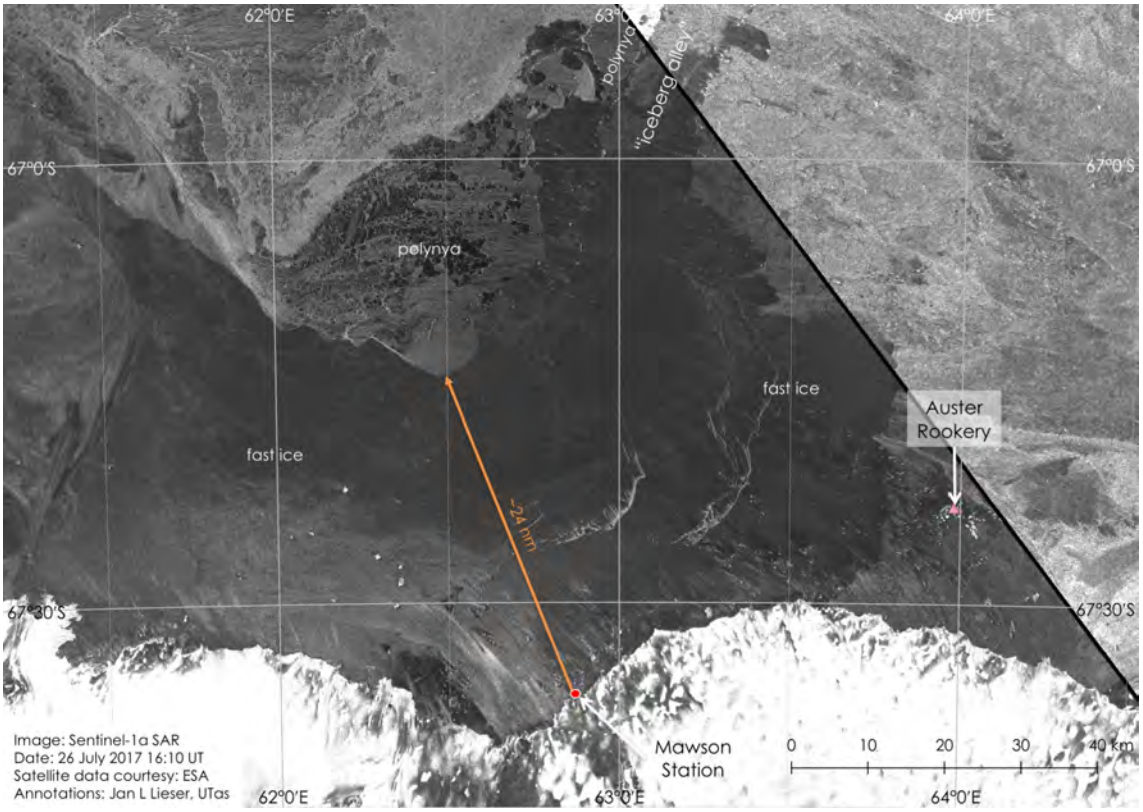

Figure 1: Sentinel-1a SAR; acquired 26/07/2017 at 16:10 UT and complemented (northeastern corner) by data acquired 25/07/2017 at 15:29 UT, both provided by PolarView.

The fast-ice edge is roughly 24 nautical miles northwest of Mawson Station. Broken pieces of ex-fast ice can be seen as dark patches, drifting westward in the polynya.

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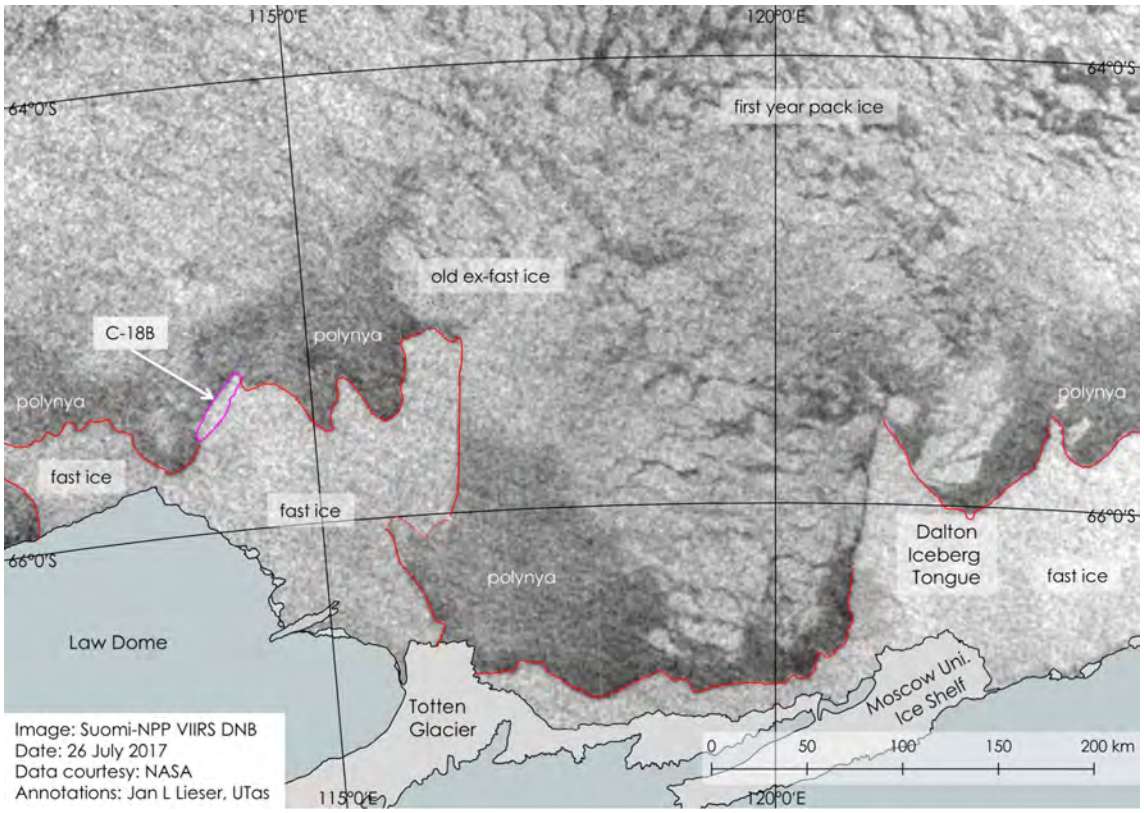

Figure 2: Suomi-NPP VIIRS panchromatic image (day-night band, DNB), acquired 26/07/2017 and provided by NASA.

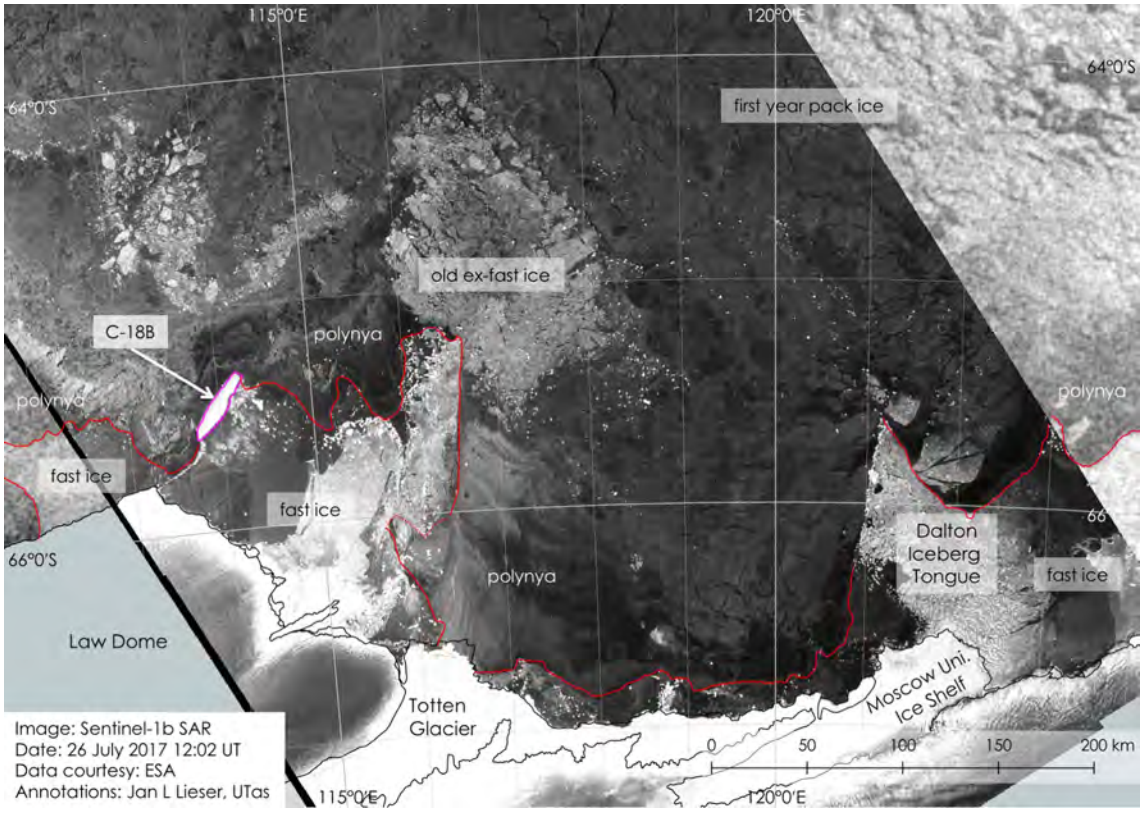

Figure 3: Sentinel-1 SAR scene acquired 26/07/2017 at 12:02 UT and provided by PolarView (background: Figure 2).

Sabrina Coast

Figures 2 and 3 show the same geographical frame off Sabrina Coast as seen by VIIRS and SAR, respectively. The fast-ice edge is indicated by a red line.

Ongoing southerly winds have opened a large polynya (now more than 13000 km^2) off Totten Glacier. Almost the entire body of old ex-fast ice has been flushed northward, out of the region.

North of the Dalton Iceberg Tongue, large floes of ex-fast ice are drifting northwestwards and are breaking up.

D'Urville Sea

Figure 4 shows a VIIRS DNB image of D'Urville Sea with an overlay of very high-resolution SAR (see above) showing Commonwealth Bay.

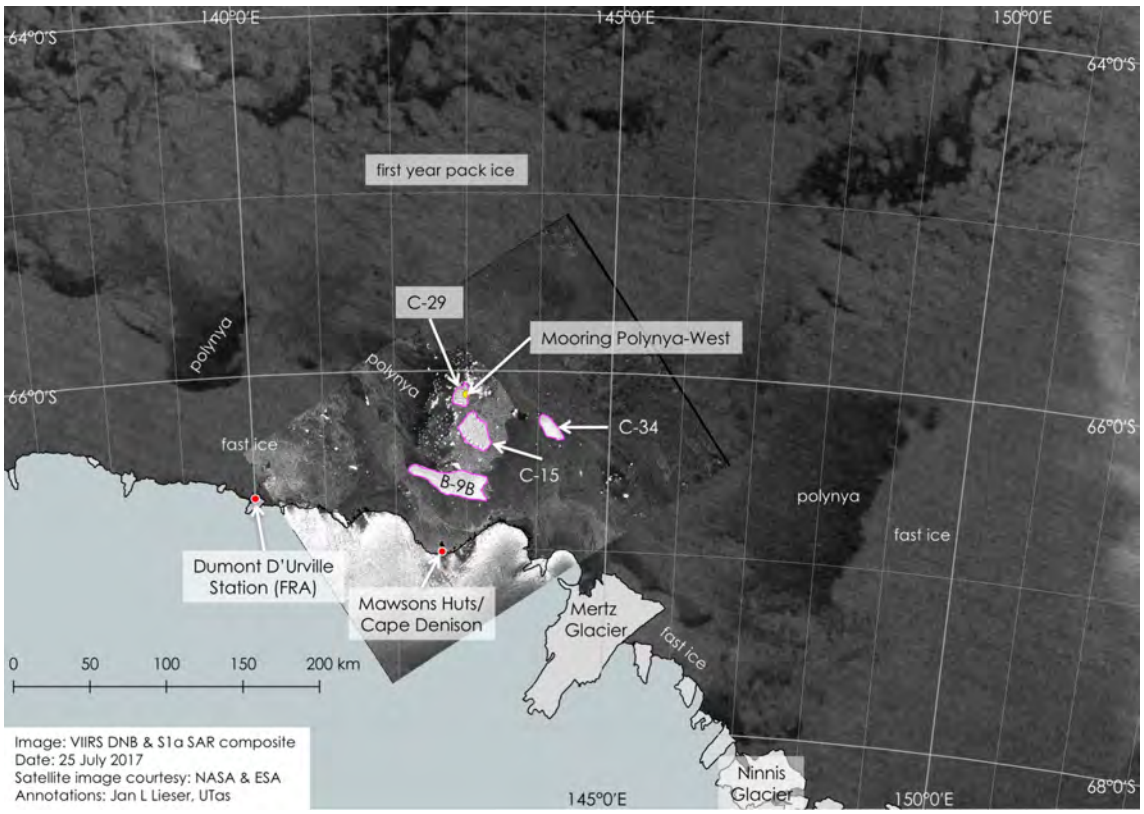

Figure 4: Suomi-NPP VIIRS DNB acquired 25/07/2017 and provided by NASA; overlay Sentinel-1a SAR scene acquired 25/07/2017 at 10:32 UT and provided by PolarView.

Offshore Mawsons Huts, a polynya is found with open water approximately half way towards iceberg B-9B, which has moved roughly 500 m westward since 13/07/2017. Iceberg C-34 continues its drift northwestward (about 25 km since 13/07/2017) while the other two large icebergs have not moved significantly during the past two weeks.

Sea Ice Report #32.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

01/08/2017

Mawson Coast

Figure 1 shows a panchromatic image off Mawson Coast.

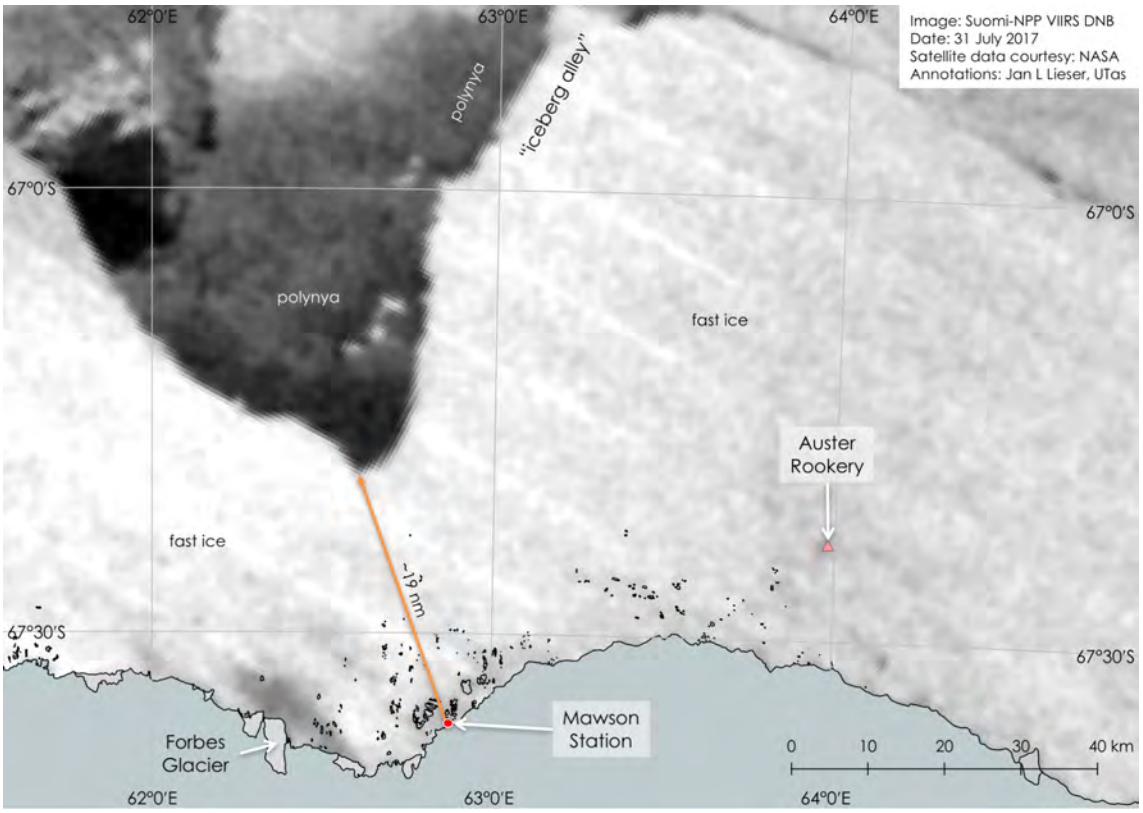

Figure 1: Suomi-NPP VIIRS panchromatic image (day-night band, DNB), acquired 31/07/2017 and provided by NASA.

Since 26/07/2017 (see Sea Ice Report #31.2/2017), the fast-ice edge of the so-called northwest polynya has progressed approximately 5 nautical miles southward and is now roughly 19 nautical miles northwest of Mawson Station.

Off Forbes Glacier (west of Mawson Station), darker shading indicates a thinner ice cover compared to the surrounding fast ice (which appears much brighter).

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Davis Station

Figure 2 shows a high-resolution SAR scene of Davis Station and surround.

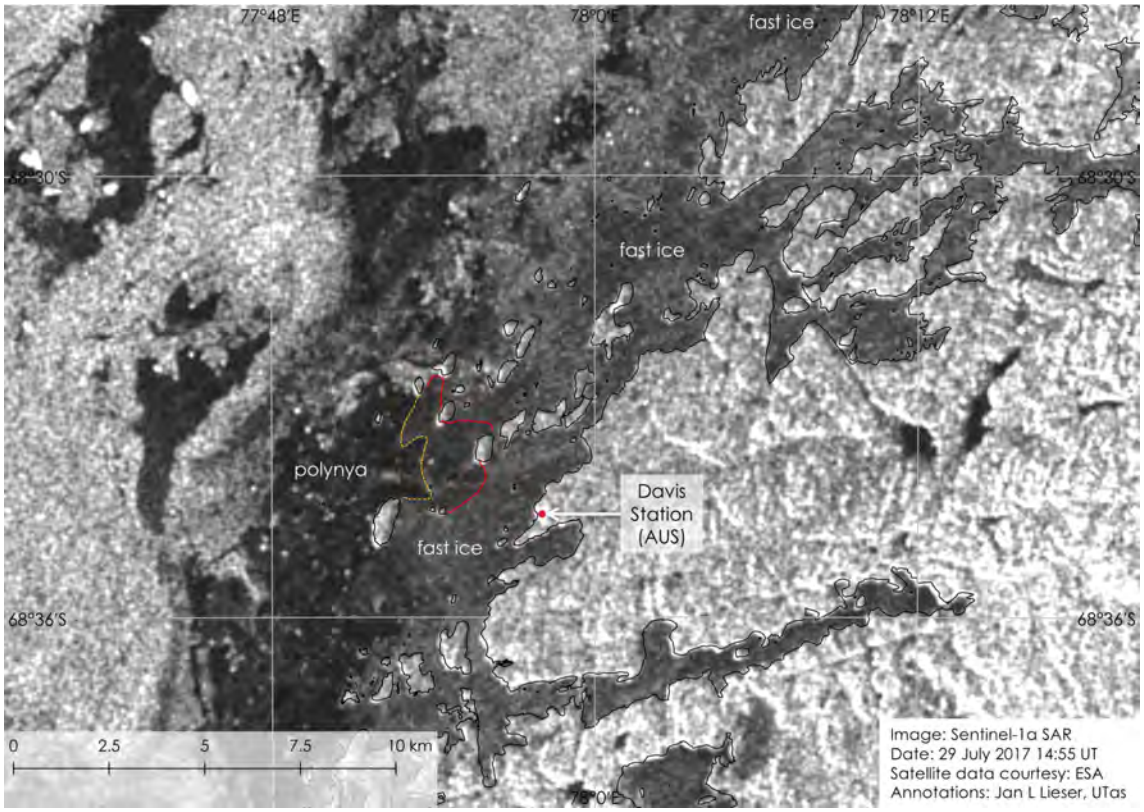

Figure 2: Sentinel-1a SAR scene acquired 29/07/2017 at 12:02 UT and provided by PolarView.

The fast-ice edge appears to be retreating towards the coast, as indicated by the orange and red scribble lines. While there remains some fast ice between the offshore islands, fast ice north of the Vestfold Hills (not shown) has been breaking up and the fast-ice edge progressing towards the coast.

Sabrina Coast

Figure 3 shows two high-resolution SAR scenes off Law Dome and Sabrina Coast.

In front of Totten Glacier, old ex-fast ice has almost completely been pushed northward into the westward sea-ice drift, where it can be tracked travelling at roughly 10 nautical miles per day. The space left behind by this old ex-fast ice has be replenished with new first-year sea ice. West of the Dalton Iceberg Tongue, a large polynya is present, where new sea ice is formed and immediately carried westward.

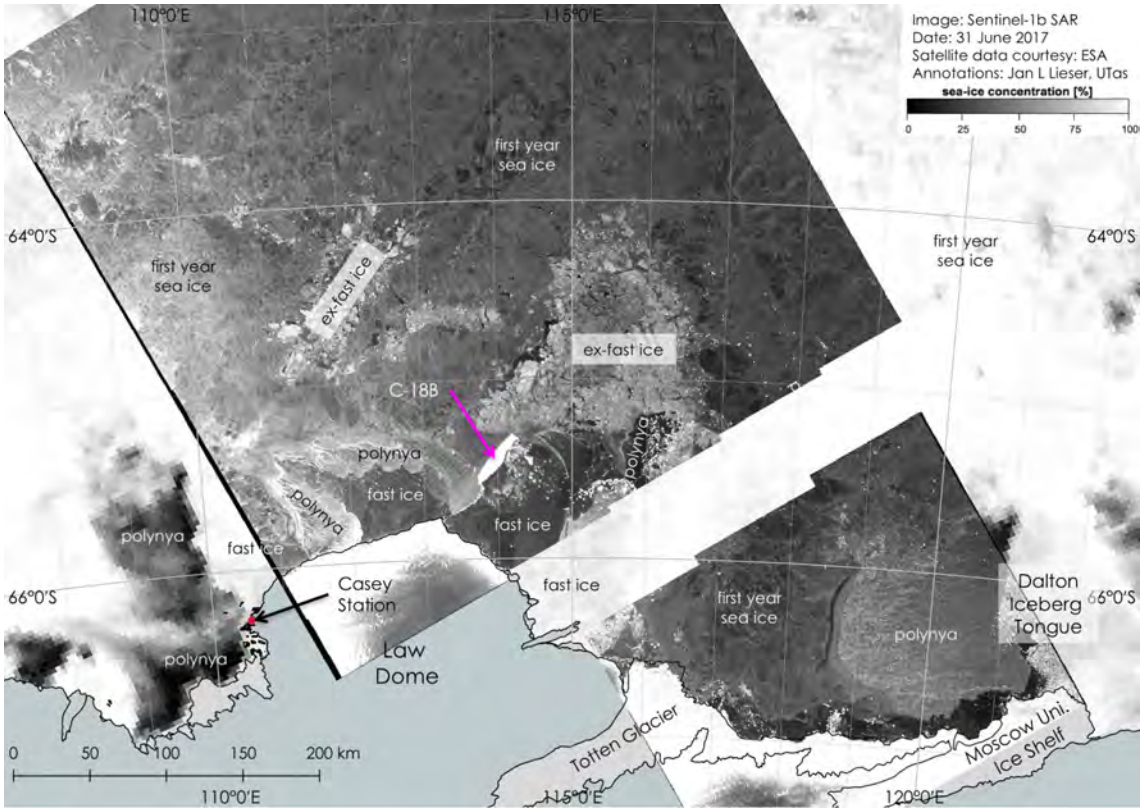

Figure 3: Sentinel-1b SAR scenes acquired 31/07/2017 (southeastern interferometric wide swath at 12:10 UT; northwestern extra-wide swath at 12:11 UT) and provided by PolarView; background: AMSR-2 sea-ice concentration chart, acquired 31/07/2017 and provided by ICDC, Universität Hamburg.

Sea Ice Report #32.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

04/08/2017

Iceberg D-15

Figure 1 shows an interferometric SAR scene of iceberg D-15B and surround.

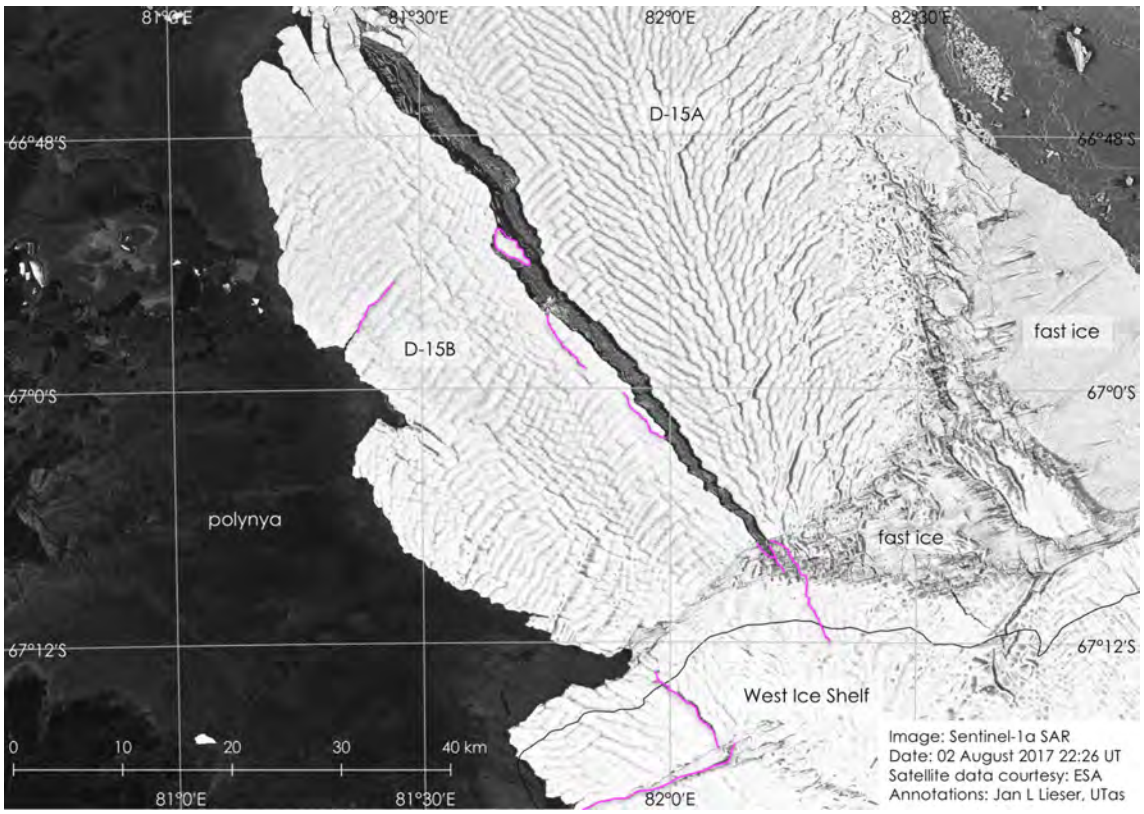

Figure 1: Sentinel-1a SAR scene acquired 02/08/2017 at 22:26 UT and provided by PolarView.

At its southern end, the rift between iceberg B-15A and B-15B can clearly be seen propagating through the fast ice, which is wedged between the bergs and the West Ice Shelf, but it also appears to be pushing a large cleft into the shelf. Along the rift between the bergs, smaller pieces of D-15B are chipping off. At the western edge of the West Ice Shelf, another potential berg seems to be ripening with large crevasses visible. All these features are marked by pink scribble lines in Figure 1.

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Sabrina Coast

Figure 2 shows a high-resolution SAR scene off Sabrina Coast. The position and orientation of iceberg B-9I (a fragment of iceberg B-9B from offshore Commonwealth Bay) on 03/08/2017 is given by the pink shape.

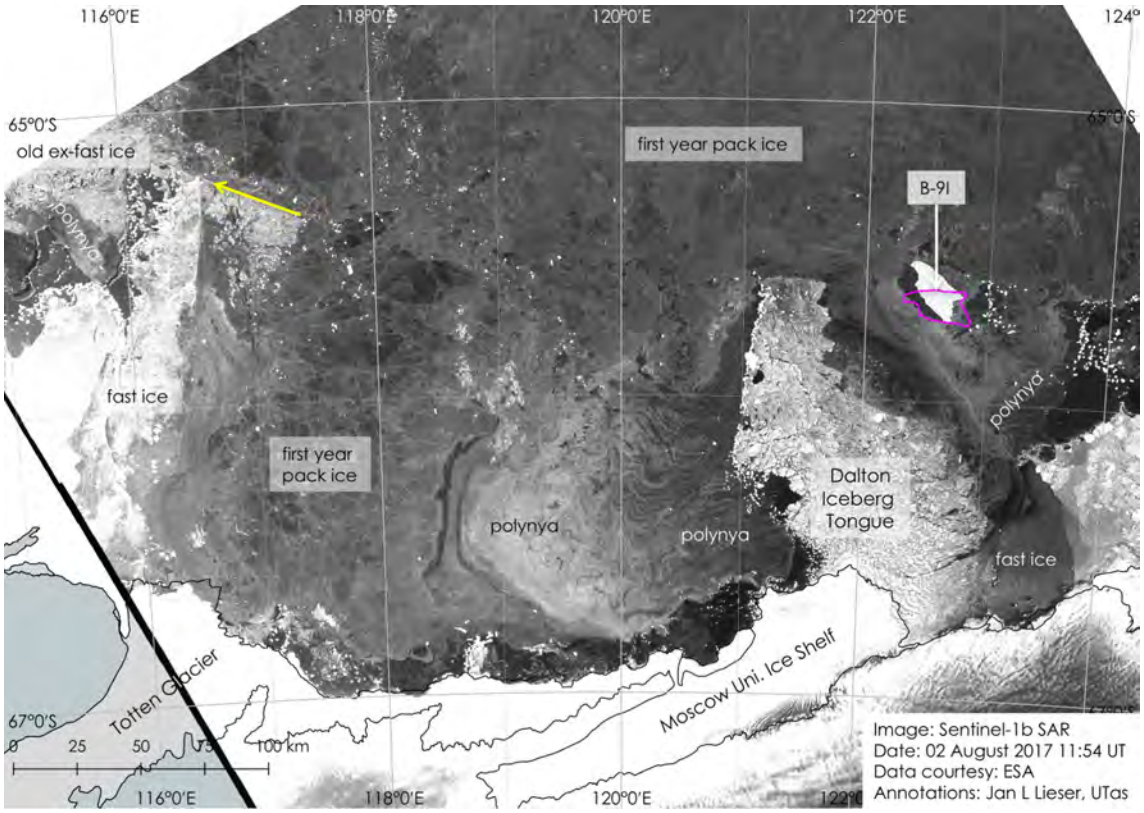

Figure 2: Sentinel-1b SAR scene acquired 02/08/2017 at 11: 54 UT and provided by PolarView.

North of Totten Glacier, a clear shear line (yellow arrow) can be seen, where old ex-fast ice had been pushed northward by recent southerly wind and entered the westward sea-ice drift. The last remaining bit of old ex-fast ice, which did not quite get pushed far enough, remains behind the fast-ice barrier.

D'Urville Sea

Figure 3 shows a panchromatic image of D'Urville Sea. The locations of four large tabular icebergs are given by pink dots. The track of iceberg C-34 since late autumn is represented by the blue line.

Off Cape Denison, a polynya is present. Other larger polynyas are also active in the region. The location of an oceanographic mooring (yellow dot) remains occupied by iceberg C-29 and a mix of smaller icebergs and sea ice.

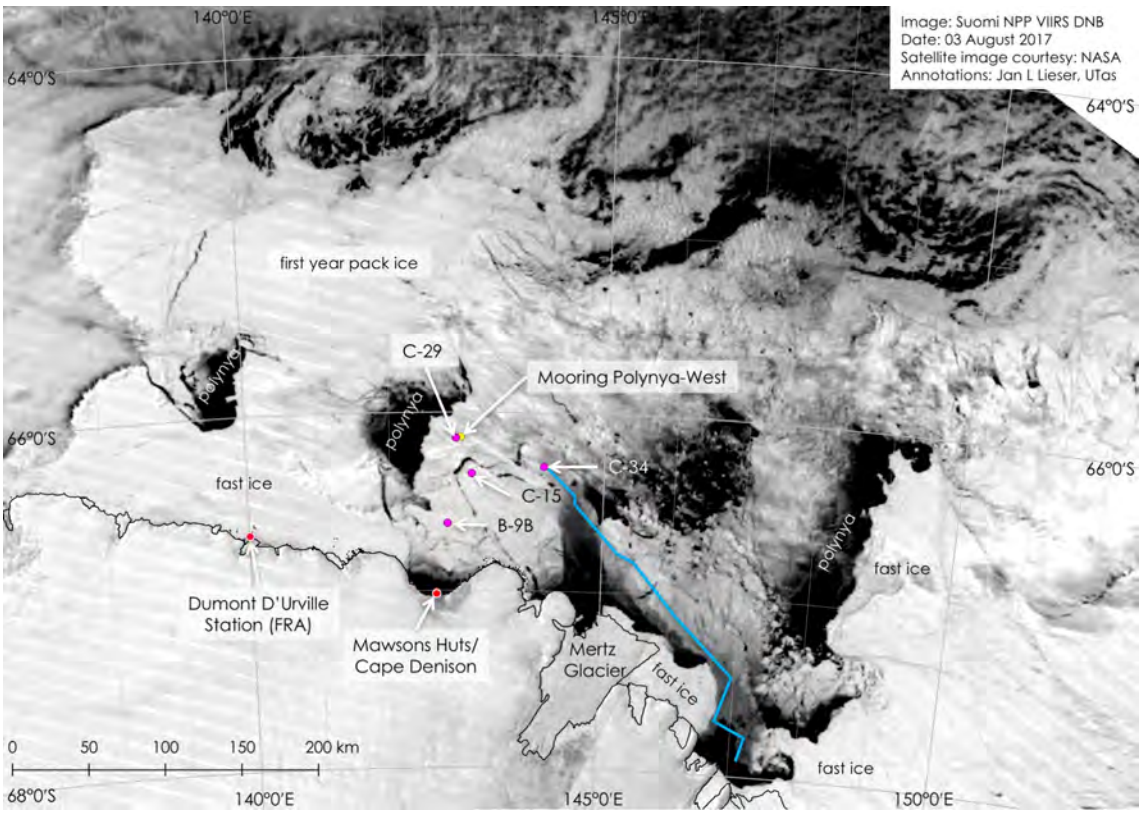

Figure 3: Suomi-NPP VIIRS panchromatic image (day-night band, DNB), acquired 03/08/2017 and provided by NASA.

Sea Ice Report #33.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

08/08/2017

The pan-Antarctic sea-ice extent is tracking well below its average for this time of year. In early August, we even observed contracting sea ice on three consecutive days of decreasing extent and area. This is attributed to synoptic-scale weather patterns across the Southern Ocean, which have pushed the sea-ice edge southward at various locations, resulting in anomalously low sea-ice concentration in the Weddell Sea, Cooperation Sea, Ross Sea and west of the northern Antarctic Peninsula.

Mawson Coast

Figure 1 shows an interferometric SAR scene of Mawson Coast.

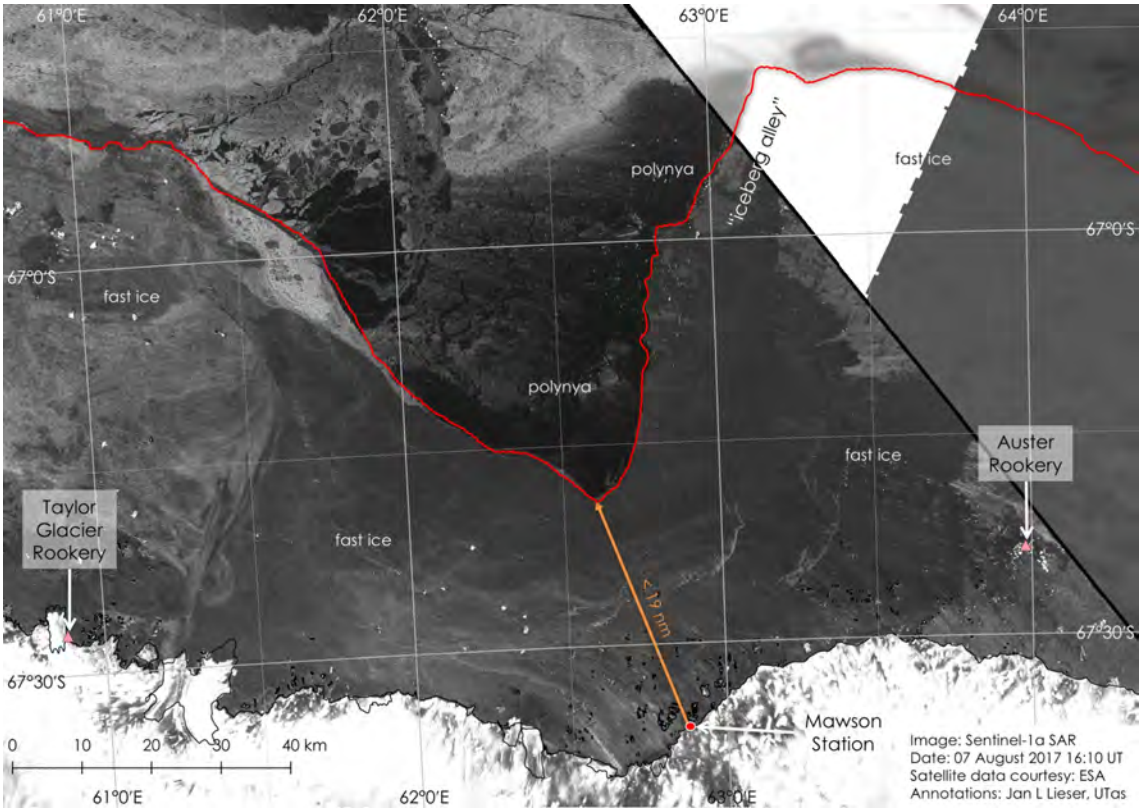

Figure 1: Sentinel-1a SAR scene acquired 07/08/2017 at 16:10 UT and provided by PolarView.

The shape of the northern fast-ice edge in the region appears largely stable in August. The distance to the so-called 'northwest polynya' has decreased only minimal and is currently just a little less than 19 nautical miles.

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Prydz Bay

Figure 2 shows a panchromatic scene of southern Cooperation Sea and Prydz Bay. The location of the fast-ice edge a month ago (06/07/2017) is indicated by dashed, red scribble lines. The current fast-ice edge is given by solid red scribble lines.

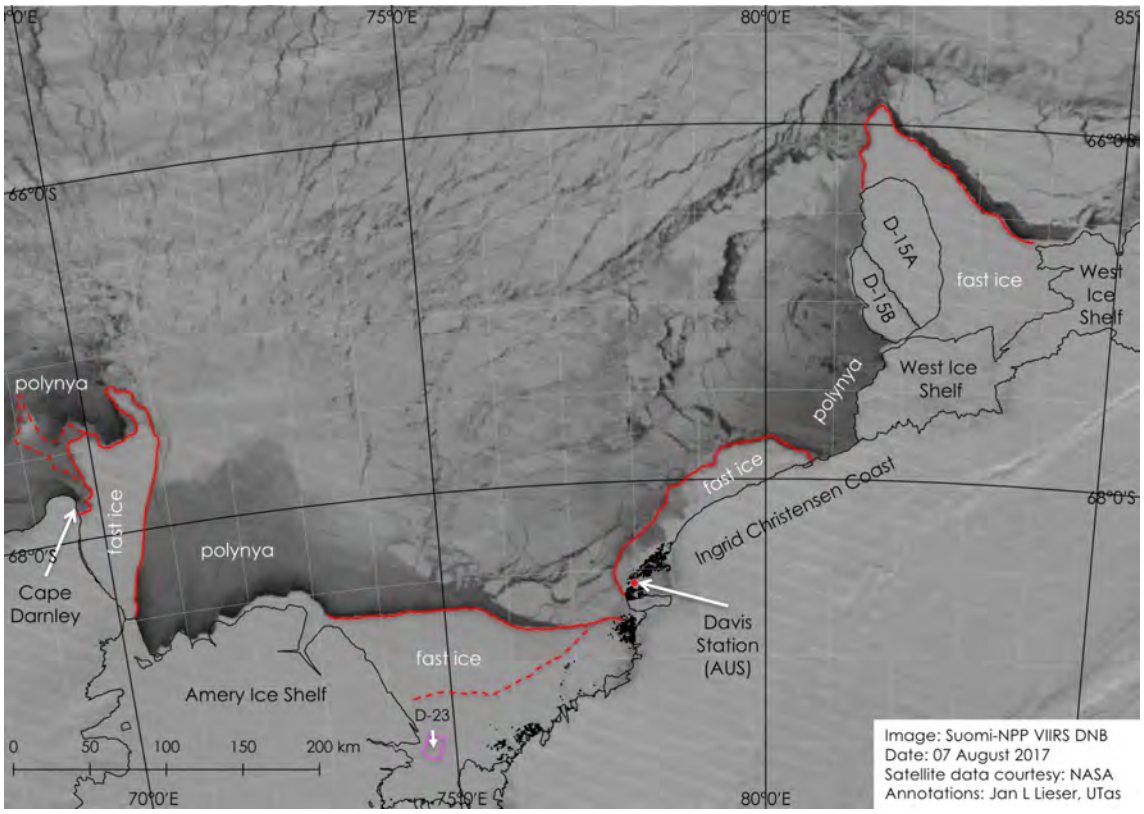

Figure 2: Suomi-NPP VIIRS panchromatic image (day-night band, DNB), acquired 07/08/2017 and provided by NASA.

North of the Amery Ice Shelf, fast ice offshore Cape Darnley is starting to break up, while Prydz Bay (north of iceberg D-23) has been filled with sea ice by recent wind conditions and shows a rather extensive fast-ice cover. At the same time, fast ice off Davis Station and to the north (along Ingrid Christensen Coast) has experienced break-up and re-growth events under changing environmental conditions.

Sabrina Coast

Figure 3 shows a high-resolution SAR scene off Sabrina Coast.

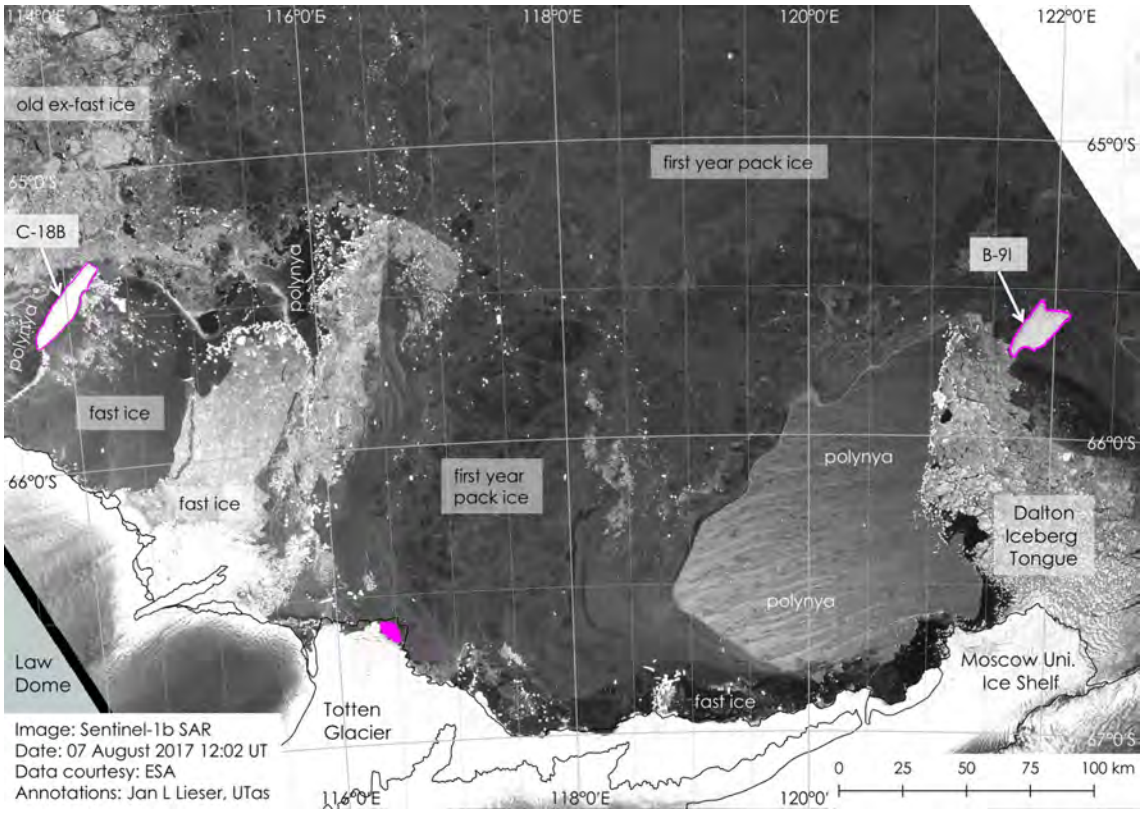

Figure 3: Sentinel-1b SAR scene acquired 07/08/2017 at 12:02 UTand provided by PolarView.

During the recent persistent south-wind event, roughly 20 smaller icebergs (each 1 km^2 to 3 km^2) have broken off the northern cliff of the Totten Glacier (pink filled shape) and already drifted north beyond (north of) 66° S. Iceberg B-9I has reached the northern edge of the Dalton Iceberg Tongue and appears to be touching old fast ice between the bergs that make up the iceberg tongue.

West of the Dalton Iceberg Tongue, the polynya measures more than 9000 km^2.

D'Urville Sea

Figure 4 shows an interferometric SAR (very high resolution) and AMSR-2 composite of D'Urville Sea.

North of Cape Denison, the positions of four large tabular icebergs can be seen clearly. Off Mawsons Huts, a polynya is frozen over by only a thin sea-ice cover. At the northern edge of the Mertz Glacier, a 'loose tooth' of approximately 180 km^2 is connected to the glacier by a small bridge of roughly 4 km (dotted part of the pink line).

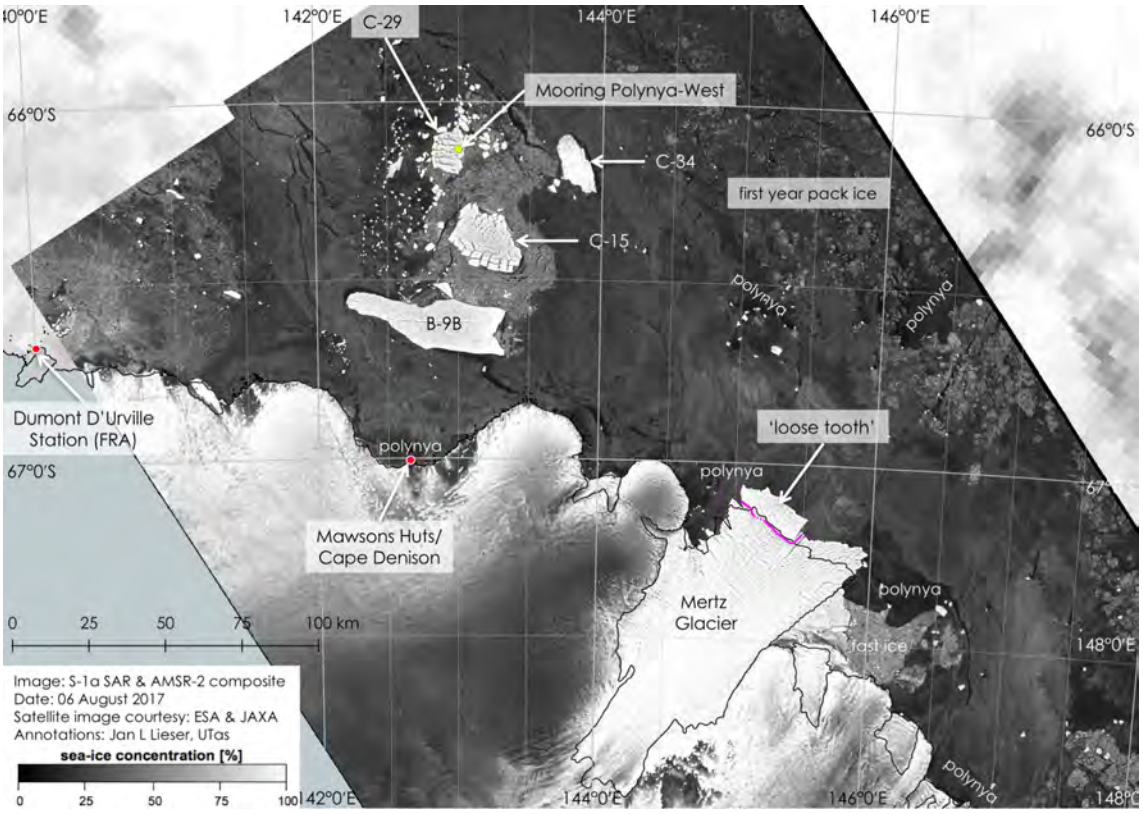

Figure 4: Sentinel-1a SAR scene acquired 06/08/2017 at 10:32 UT and provided by PolarView.

Sea Ice Report #33.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

09/08/2017

Davis Station

Figure 1 shows an interferometric (very high resolution) SAR scene of the Vestfold Hills and offshore.

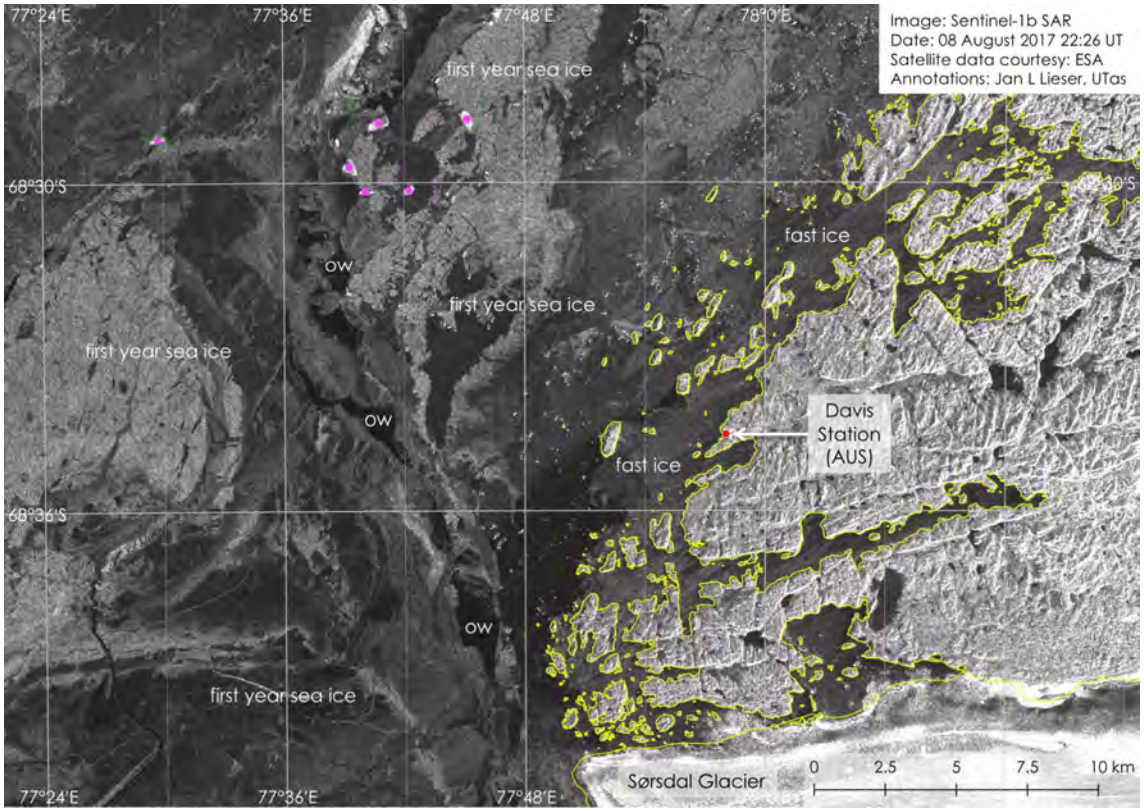

Figure 1: Sentinel-1b SAR scene, acquired 08/08/2017 at 22:26 UT and provided by PolarView.

The region offshore appears almost completely ice covered but the sea ice shows diverse signatures representing different types of thickness and roughness. There are only very small pockets of open water (OW).

Landlocked fast ice reaches only the outer edges of offshore islands. A cluster of icebergs (marked by pink dots) of less than 200 m^2 each is drifting southwestward and some smaller icebergs are located between the cluster and the shore.

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Sea Ice Report #33.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

10/08/2017

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for July 2017 for Antarctica.

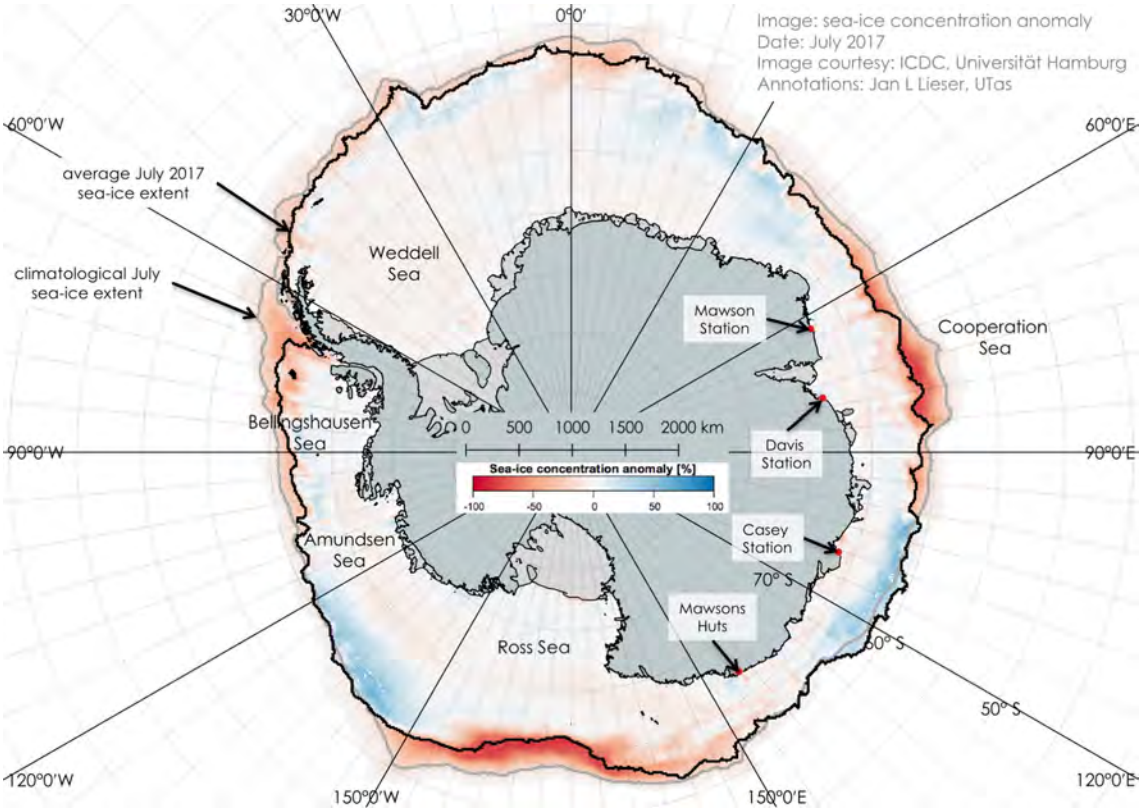

Figure 1: Sea-ice concentration anomaly of July 2017 provided by ICDC, Universität Hamburg

Throughout July 2017, the overall negative trend of sea-ice concentration and extent remained around Antarctica. Only two regions are notable exceptions and those are between 100° E and 130° E in East Antarctica and between 115° W and 155° W in the western Amundsen Sea/eastern Ross Sea, where the outer margin of the sea-ice zone showed significant above average concentration within the climatological boundaries of sea-ice extent.
Globally, sea-ice extent was at record low levels through all of July 2017 and sea-ice area was only temporarily above 2011 levels (in early July) and 2016 levels (in late July).

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Sea Ice Report #34.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

15/08/2017

Mawson Coast

Figure 1 shows a SAR scene of Mawson Coast.

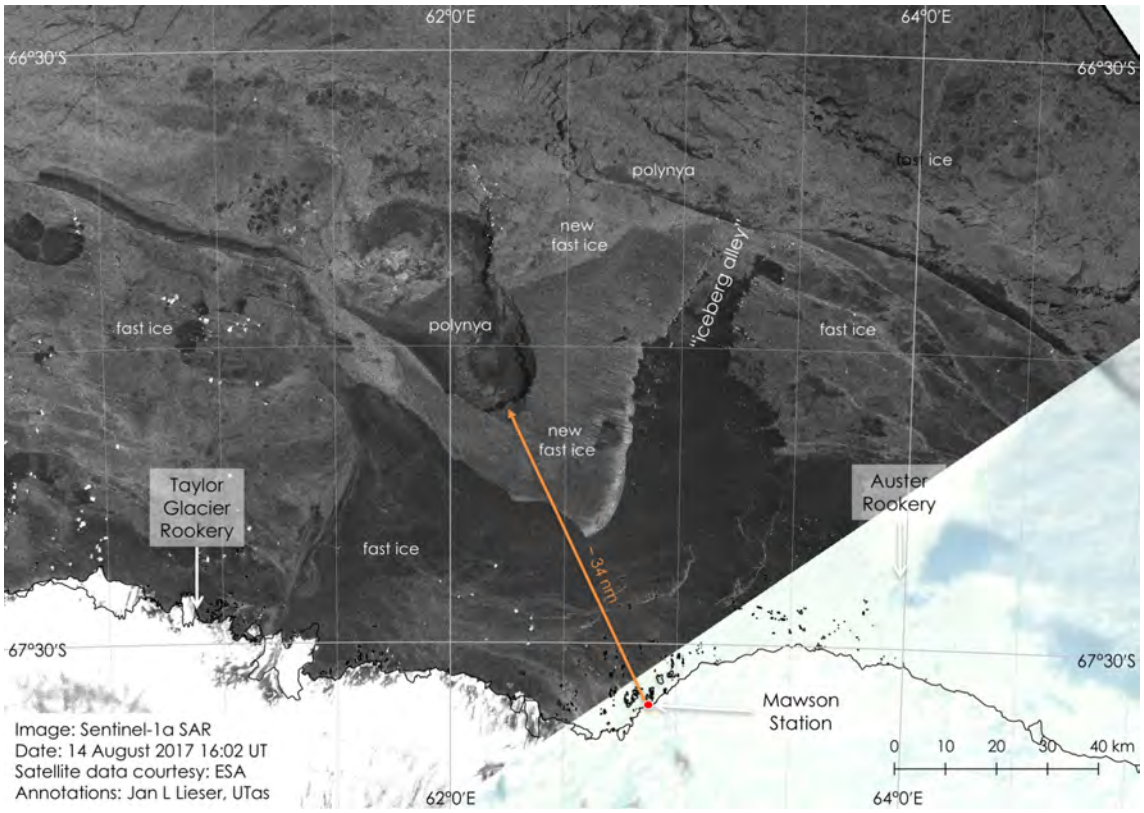

Figure 1: Sentinel-1a SAR scene acquired 14/08/2017 at 16:02 UT and provided by PolarView; complemented by Suomi-NPP VIIRS VIS data acquired 14/08/2017 and provided by NASA.

Since 10/08/2017, atmospheric conditions have allowed for new fast ice to grow off the established fast-ice edge northwest of Mawson Station. The different surface structure can clearly be distinguished in the SAR scene (Figure 1). The so-called northwest polynya is now roughly 39 nautical miles away from the station.

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Sabrina Coast

Figure 2 shows a high-resolution SAR scene off Sabrina Coast.

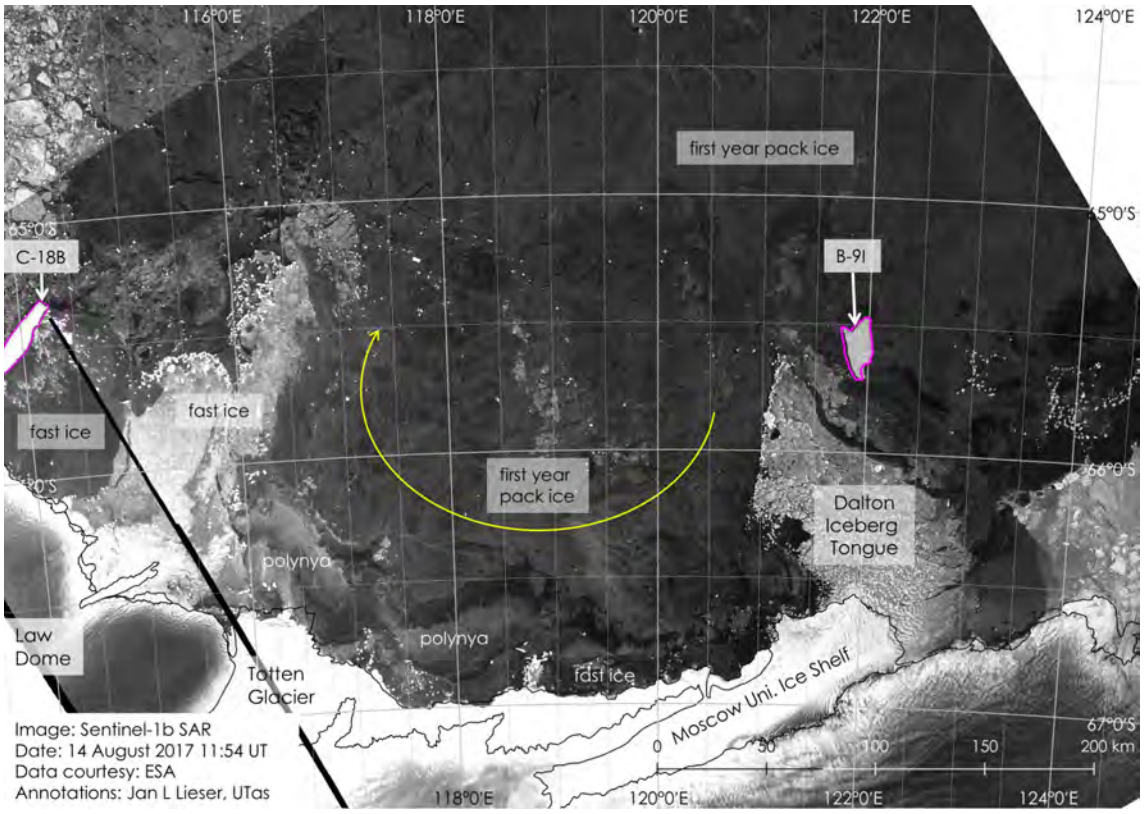

Figure 2: Sentinel-1b SAR scene acquired 14/08/2017 at 11:54 UT, complemented by Sentinel-1a SAR data acquired 13/08/2017 at 12:03 UT, both provided by PolarView.

North of Totten Glacier, the last remaining patch of old and rough ex-fast ice appears to have been pushed around the corner into the westward drift of first-year sea ice at around 65° S.

Between the fast ice northeast of Law Dome and the Dalton Iceberg Tongue, the entire first-year pack ice is currently rotating clockwise (yellow arrow) in response to a small low pressure system, which is moving eastward with its centre at roughly 63° S. While iceberg B-9I is still in about 1300 m water-depth, it has travelled more south than west during the past 24 hours, following the passage of the low pressure system as well, which has also led to small reduction in width of the crack between the fast ice of the Dalton Iceberg Tongue and a patch of ex-fast ice that had recently broken off to the north of the tongue.

D'Urville Sea

Figure 3 shows a visible scene of D'Urville Sea.

North of Cape Denison, the positions of four large tabular icebergs are marked with pink outlines. Icebergs C-15 and C-34 are still moving, with C-34 travelling more northerly than west during the past couple of days. Iceberg B-9B is showing slight east-west movement, back and forth.

Off Mawsons Huts, a polynya is active and in the entire scene cloud formation can be seen north of thin ice of polynyas (see for example north of Dumont D'Urville Station, off Cape Denison and north of the Mertz Glacier), which indicates ongoing upward oceanic heat flux.

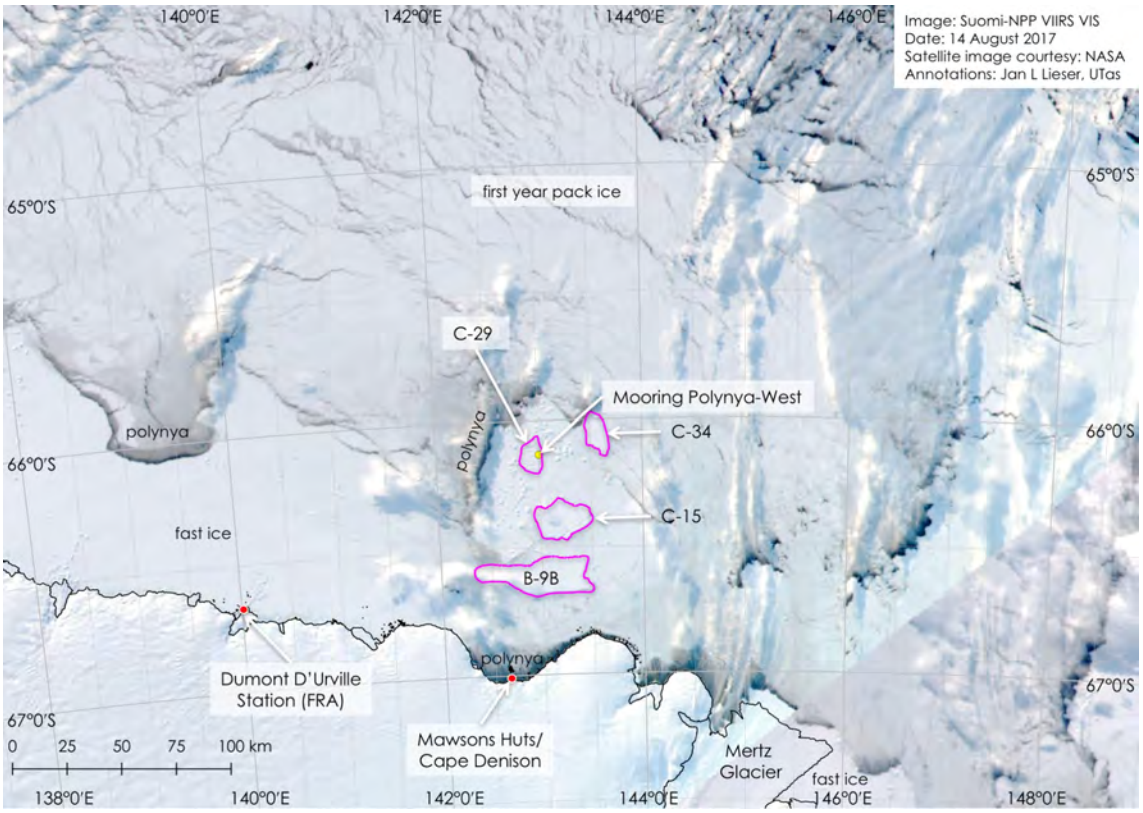

Figure 3: Suomi-NPP VIIRS VIS scene acquired 14/08/2017 and provided by NASA.

Sea Ice Report #35.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/08/2017

Davis Station

Figure 1 shows a visible scene of the Vestfold Hills and Rauer Group; Figure 2 shows the same geographical frame as seen by interferometric SAR (very high resolution) roughly 18 hours later.

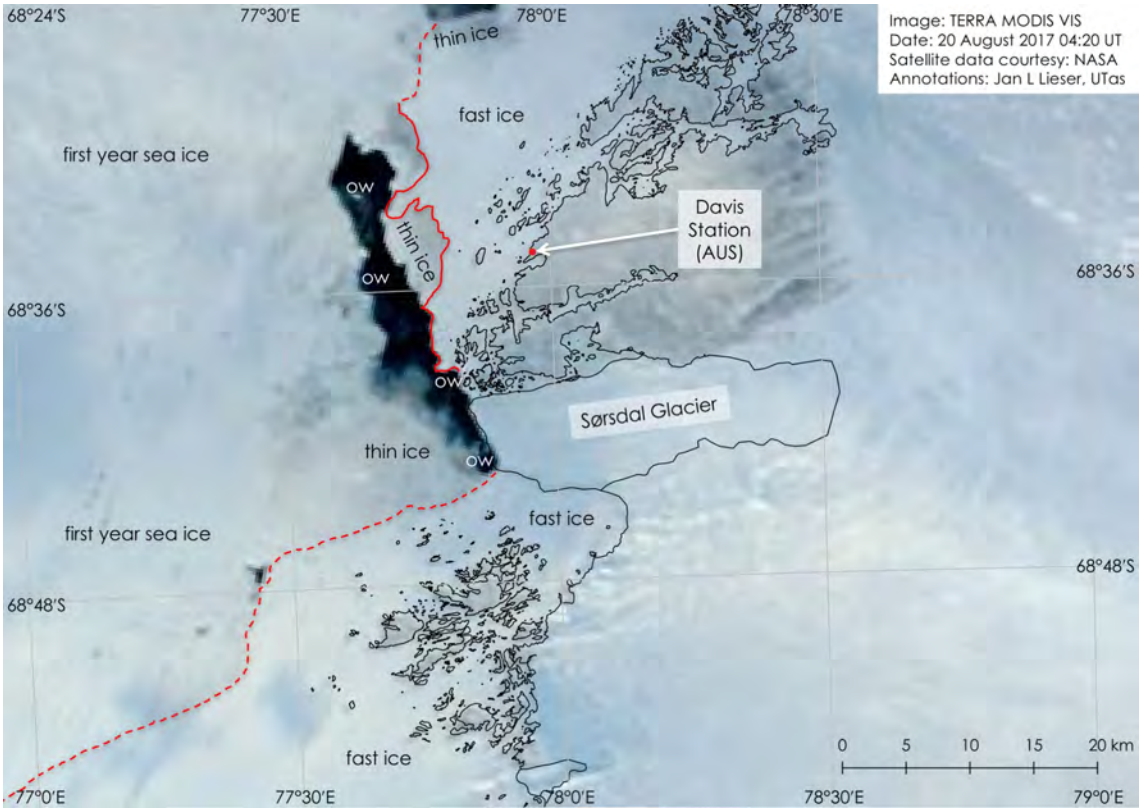

Figure 1: TERRA MODIS VIS data acquired 20/08/2017 and provided by NASA.

Off Davis Station, open water (OW) can be seen off fast ice approximately 9 km southwest of the station. A transition region between two types of fast ice (primarily related to age and therefore thickness) is marked by a red scribble line, approximate location of the fast-ice edge elsewhere is given by a dashed, red scribble line.

The western face of Sørsdal Glacier is free of sea ice. The Rauer Group (the group of islands south of the glacier) is enclosed by fast ice.

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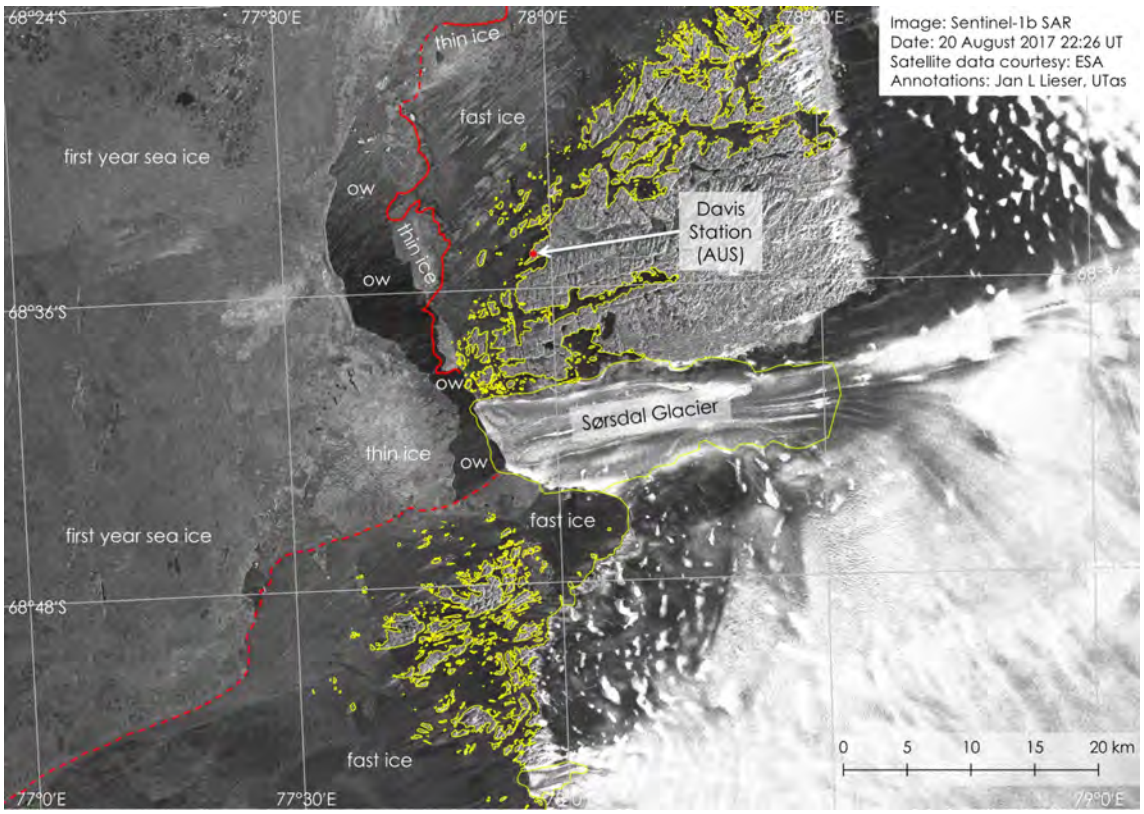

Figure 2: Sentinel-1a SAR scene acquired 20/08/2017 at 22:26 UT and provided by PolarView.

D'Urville Sea

Figure 3 shows a very high resolution (interferometric) SAR scene of Commonwealth Bay, off Cape Denison.

North of the cape, the positions of four large tabular icebergs on 06/08/2017 are marked with pink outlines. Icebergs C-15 and C-34 are not well grounded, with C-15 rotating 50 degrees anti-clockwise and C-34 travelling more north than west during the past two weeks. Iceberg B-9B is exhibiting overall eastward movement during that time.

Off Mawsons Huts, a polynya is filled with broken new sea ice. Deformed old sea ice between the icebergs (now ex-fast ice) has large cracks and openings, which is another indicator of the ongoing dynamics of the region.

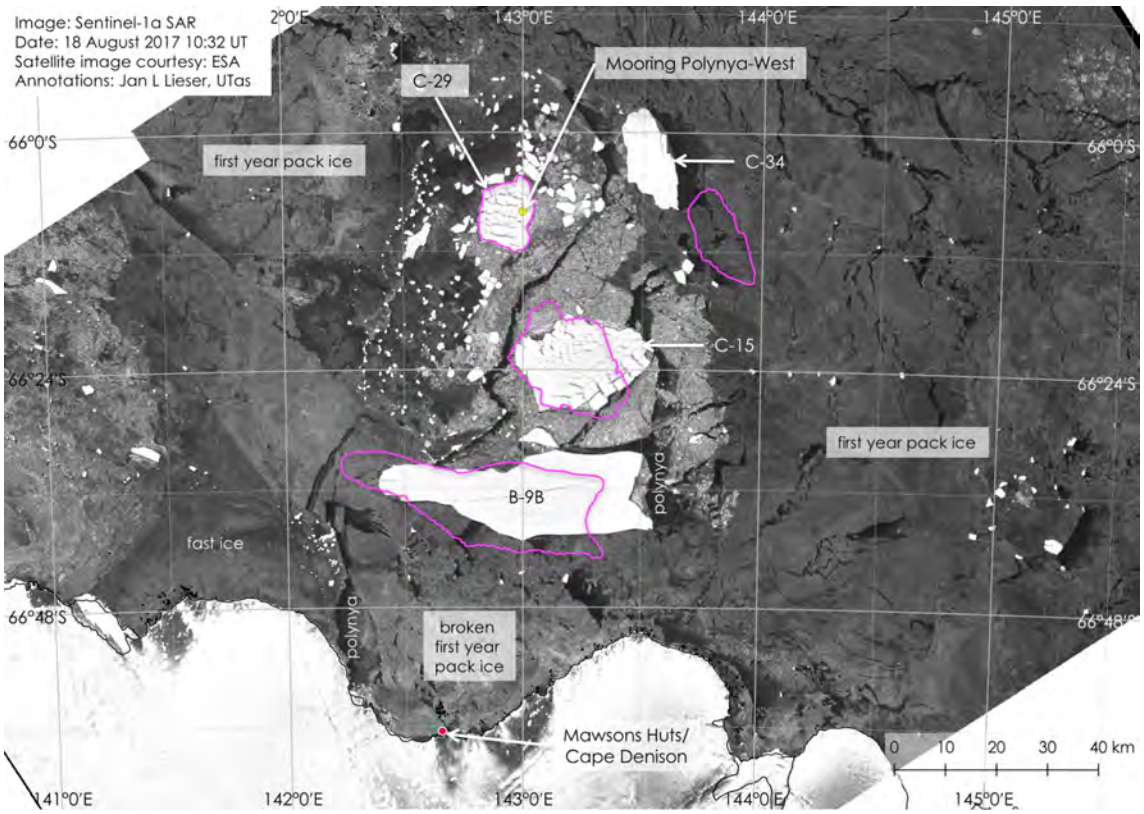

Figure 3: Sentinel-1a SAR scene acquired 18/08/2017 at 10:32 UT and provided by PolarView.

Sea Ice Report #35.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

22/08/2017

Casey Station

Figure 1 shows a very high resolution SAR Interferometric Wide (IW) swath mode scene of Casey Station and offshore.

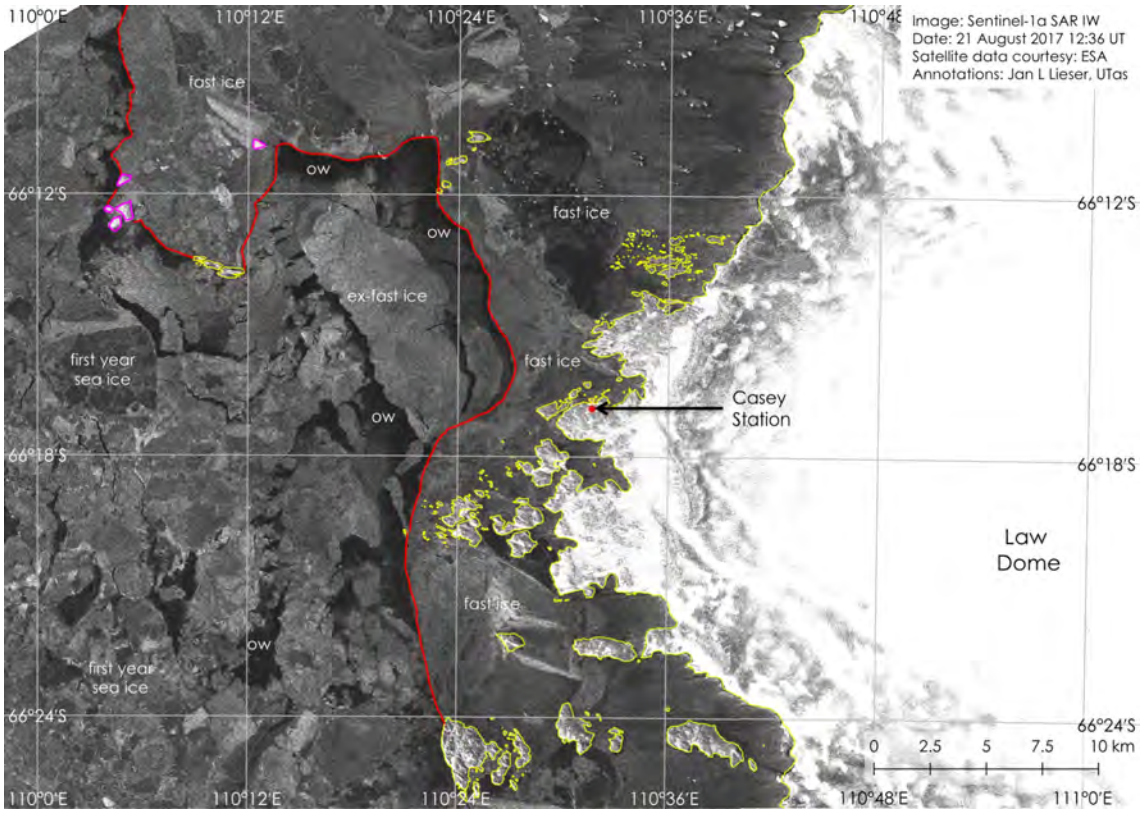

Figure 1: Sentinel-1a SAR Interferometric Wide swath mode scene acquired 21/08/2017 at 12:36 UT and provided by PolarView.

Approximately 4 km west of Casey Station, open water (OW) can be seen off fast ice. North of the station, fast ice is pinned by islands and some icebergs (pink shapes) and the patchy structure of fast ice relates to different growth and accretion stages during the formation process.

The first-year sea ice offshore shows similar patchiness and appears highly mobile.

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D'Urville Sea

Figure 2 shows a visible scene of Commonwealth Bay, off Cape Denison. Dotted shapes represent the positions of three large icebergs on 06/08/2017 and dashed shapes their positions on 18/08/2017 (see Sea Ice Report #35.1/2017).

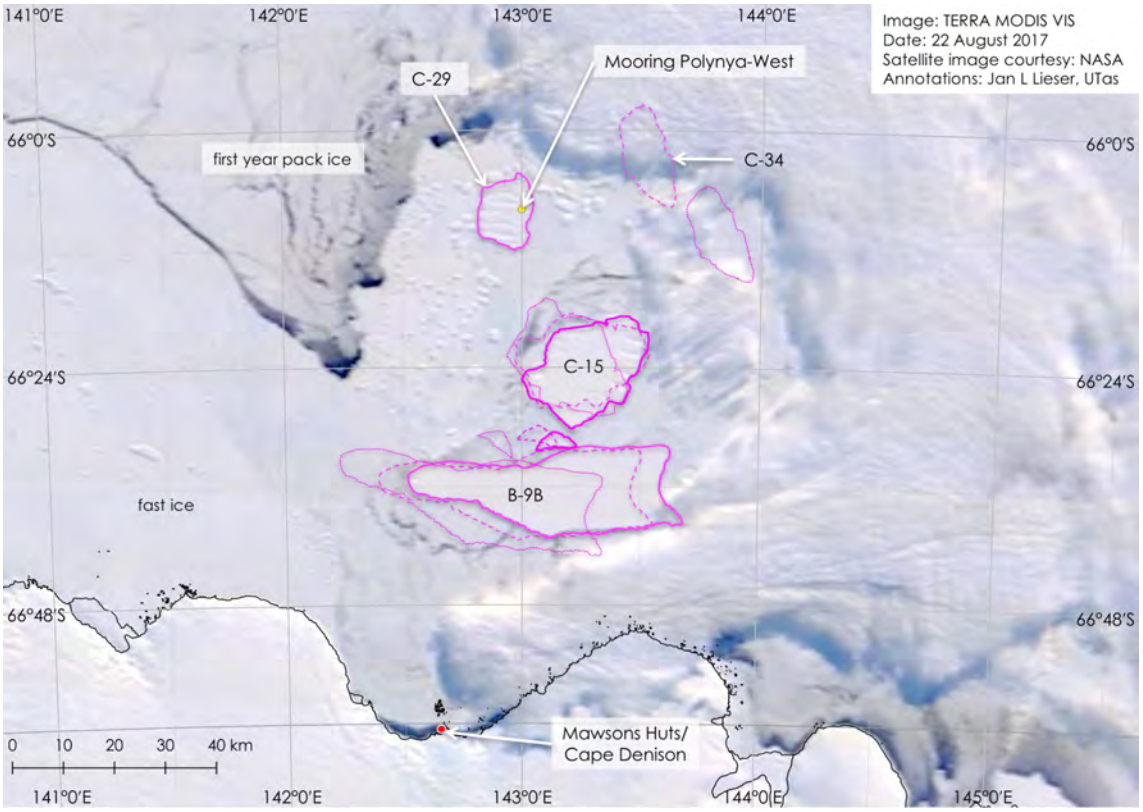

Figure 2: TERRA MODIS VIS data acquired 22/08/2017 and provided by NASA.

Since 18/08/2017, iceberg B-9B has travelled a further 5.5 km eastward (as well as its triangular splinter between B-9B and C-15) and iceberg C-15 rotated another 15 degrees anti-clockwise. The current position of iceberg C-34 is obscured by clouds.

Sea Ice Report #35.3/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

24/08/2017

Mawson Coast

Figure 1 shows a visible scene of Mawson Coast and offshore. The so-called northwest polynya is approximately 33 nautical miles away from Mawson Station. Three known penguin colonies are marked by pink triangles.

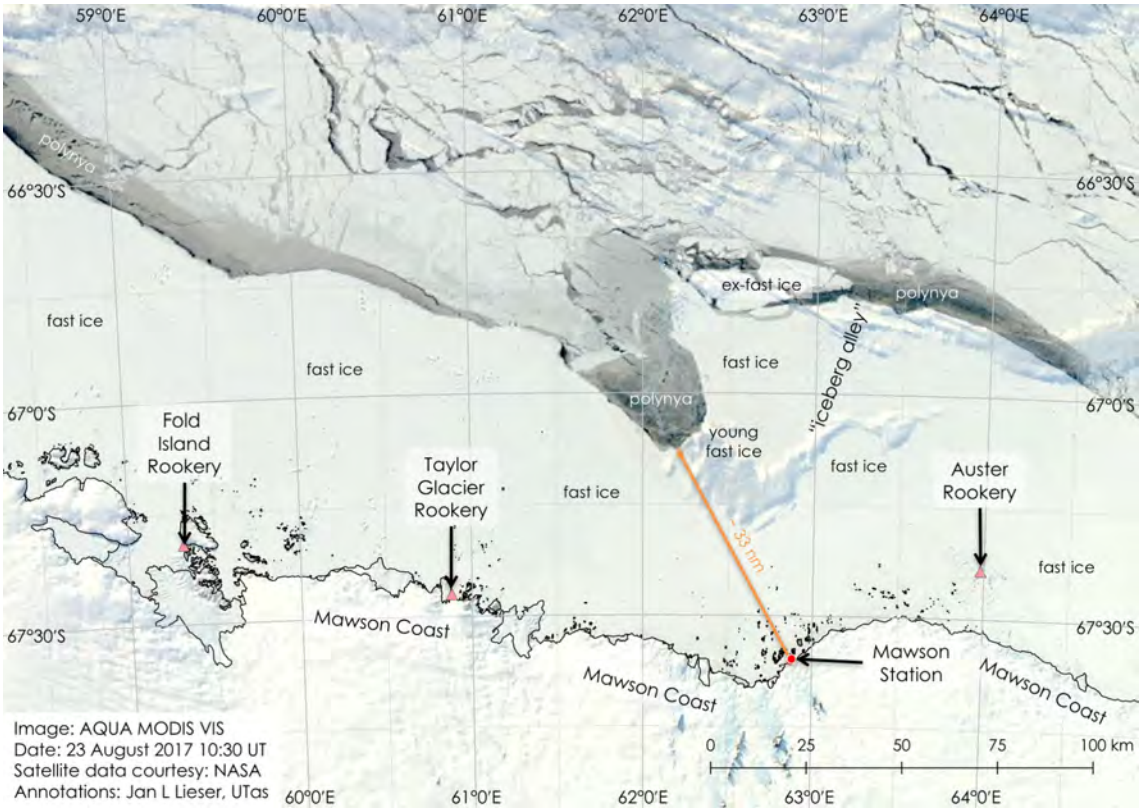

Figure 1: AQUA MODIS VIS scene acquired 23/08/2017 and provided by NASA.

West of "iceberg alley", the northern fast-ice edge shows signs of breaking up since 19/08/2017.

The different fast-ice properties as seen in RADAR data (see Sea Ice Report #34.1/2017) are not reflected in the visible data that appears to show a uniform fast-ice cover with no obvious large cracks or openings, but some interspersed icebergs.

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D'Urville Sea

Figure 2 shows a visible scene of Commonwealth Bay, off Cape Denison. Dashed shapes represent the positions of three large icebergs on 18/08/2017 (see Sea Ice Report #35.1/2017).

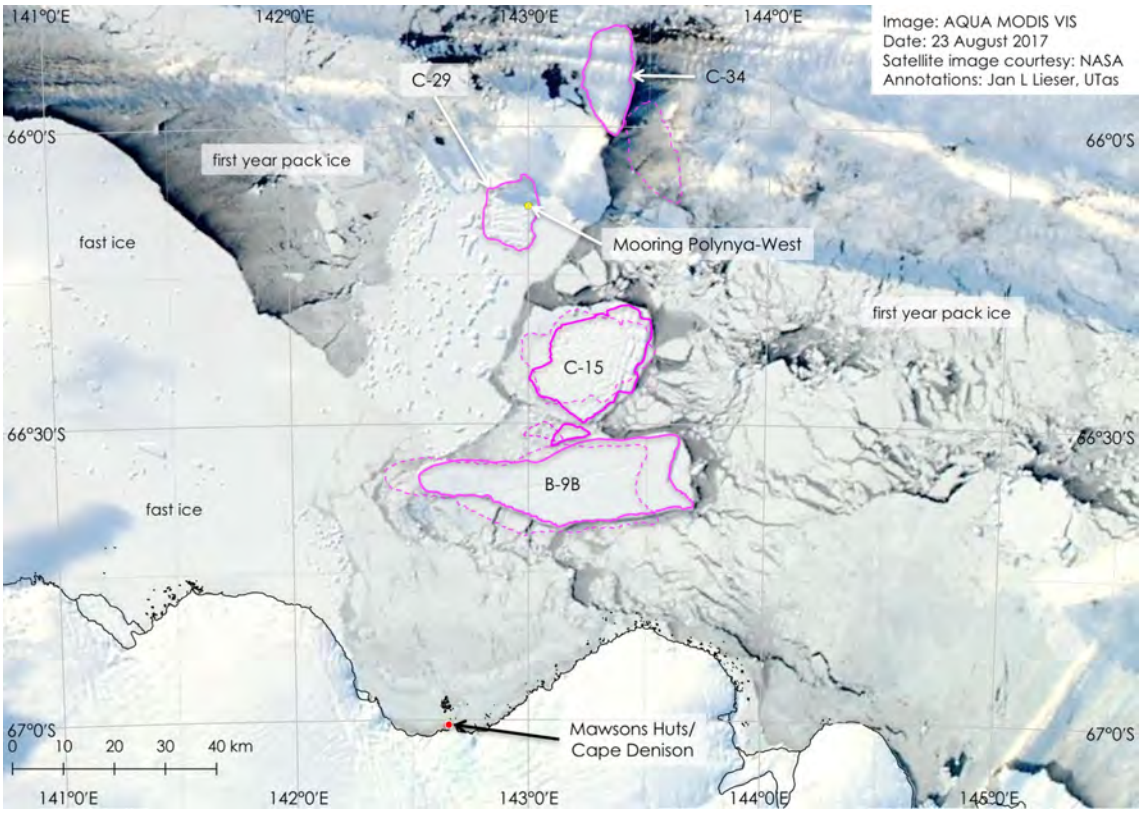

Figure 2: AQUA MODIS VIS data acquired 23/08/2017 and provided by NASA.

Since 22/08/2017, iceberg B-9B has travelled roughly 2 km eastward (as well as its triangular splinter between B-9B and C-15) and iceberg C-15 rotated another 10 degrees anti-clockwise. Iceberg C-34 is now almost entirely north of 66° S and therefore in water depths deeper than 500 m.

Sea Ice Report #36.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

28/08/2017

Davis Station

Figure 1 shows a very high resolution SAR scene of the Vestfold Hills and Rauer Group, north and south of Sørsdal Glacier, respectively.

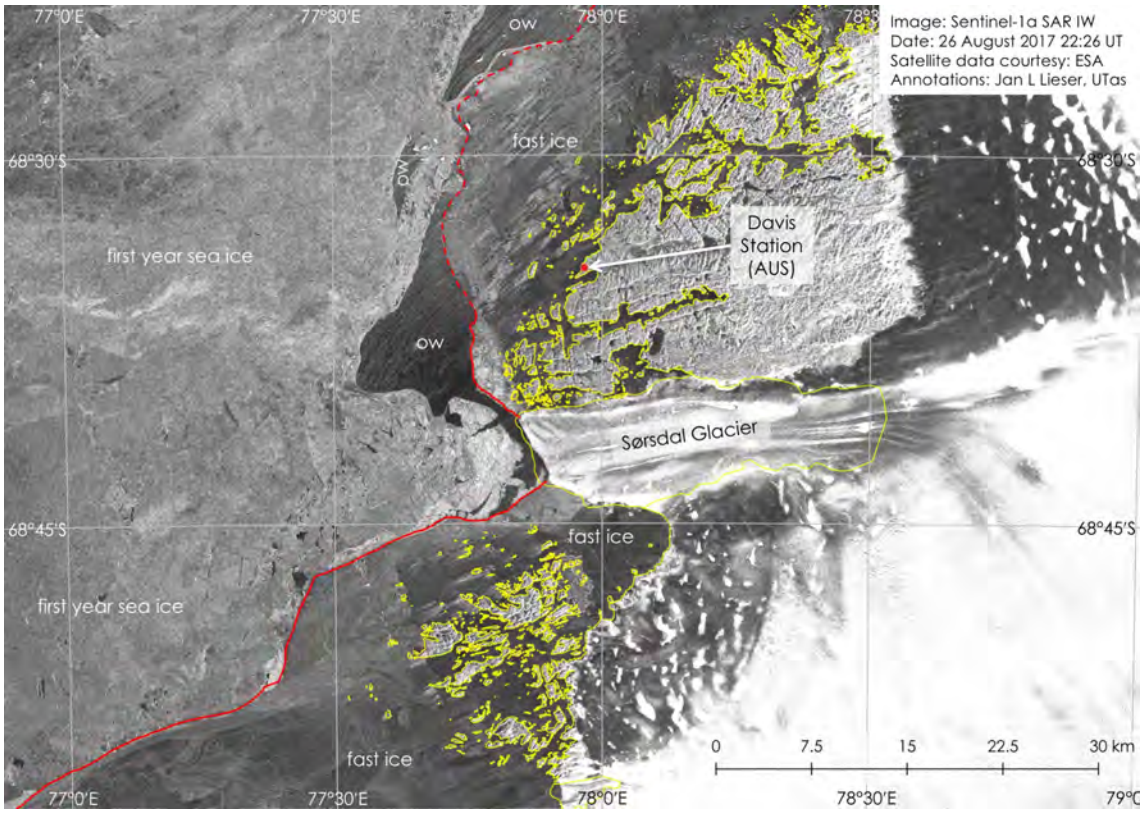

Figure 1: Sentinel-1a SAR scene acquired 26/08/2017 and provided by PolarView.

Off the Vestfold Hills, the dashed, red line approximates a fuzzy fast-ice edge, even though there is open water (OW) offshore, whereas further south, a solid red line shows the fast-ice edge more clearly defined as the transition zone between the fast ice (represented in darker grey) and first-year pack ice (represented by brighter grey, indicating a rougher surface).

The western front of Sørsdal Glacier is free of sea ice.

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D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea. Dashed, pink shapes represent the positions of three large icebergs on 23/08/2017 (see Sea Ice Report #35.3/2017). The red-white scribble line gives the location of the fast-ice edge on 23/08/2017.

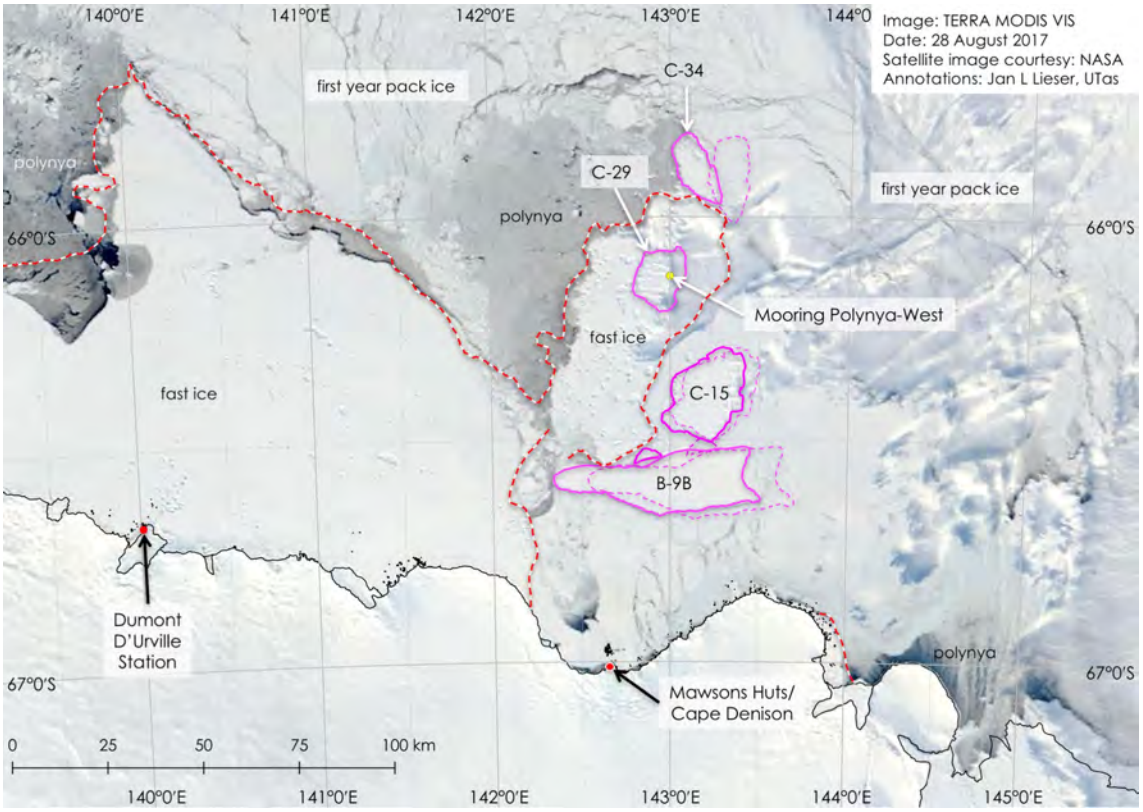

Figure 2: TERRA MODIS VIS data acquired 28/08/2017 and provided by NASA.

During the past five days, iceberg B-9B has travelled roughly 8.5 km westward (as well as its triangular splinter north of it) and iceberg C-15 rotated another 10 degrees anti-clockwise. Iceberg C-29 is grounded while iceberg C-34 is now completely north of 66° S (in water depths deeper than 500 m) and travelling in northwestward direction.

Sea Ice Report #36.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

01/09/2017

This winter season so far, the highest Antarctic sea-ice area was recorded for 23/08/2017 at 13.9 $\times$ 10^6 km^2 and the largest extent was recorded a day later at 17.7 $\times$ 10^6 km^2 (analysis courtesy Phil Reid, Bureau of Meteorology).

Mawson Coast

Figure 1 shows a visible scene of Mawson Coast and offshore. The so-called northwest polynya is approximately 32 nautical miles away from Mawson Station. Two known penguin colonies are marked by pink triangles.

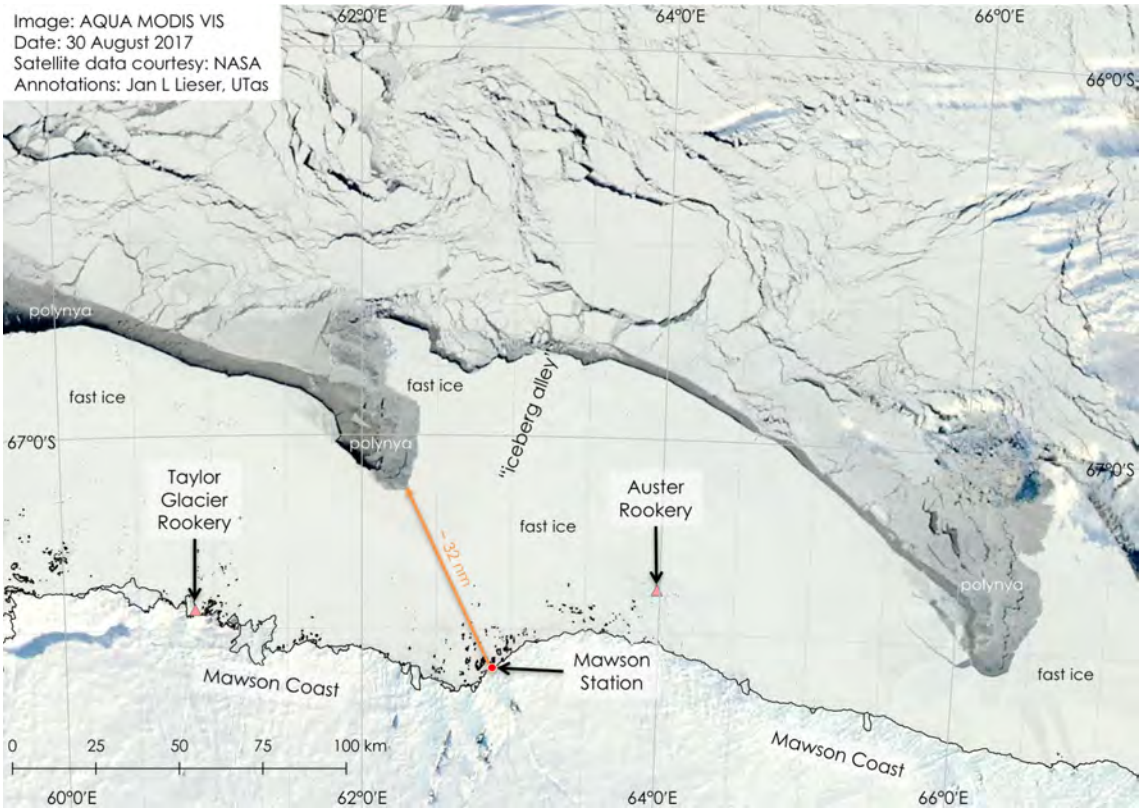

Figure 1: AQUA MODIS VIS scene acquired 30/08/2017 and provided by NASA.

The distance between Mawson Station and the northwest polynya is slightly reduced, due to melting and breaking fast ice at the edge. At roughly 66° E, fast ice starts breaking away from the main fast-ice sheet, where a large floe of fast ice is splitting off.

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Figure 2 shows a very high-resolution (15 m) panchromatic (visible) scene of the region of Auster Rookery (northeast of Mawson Station).

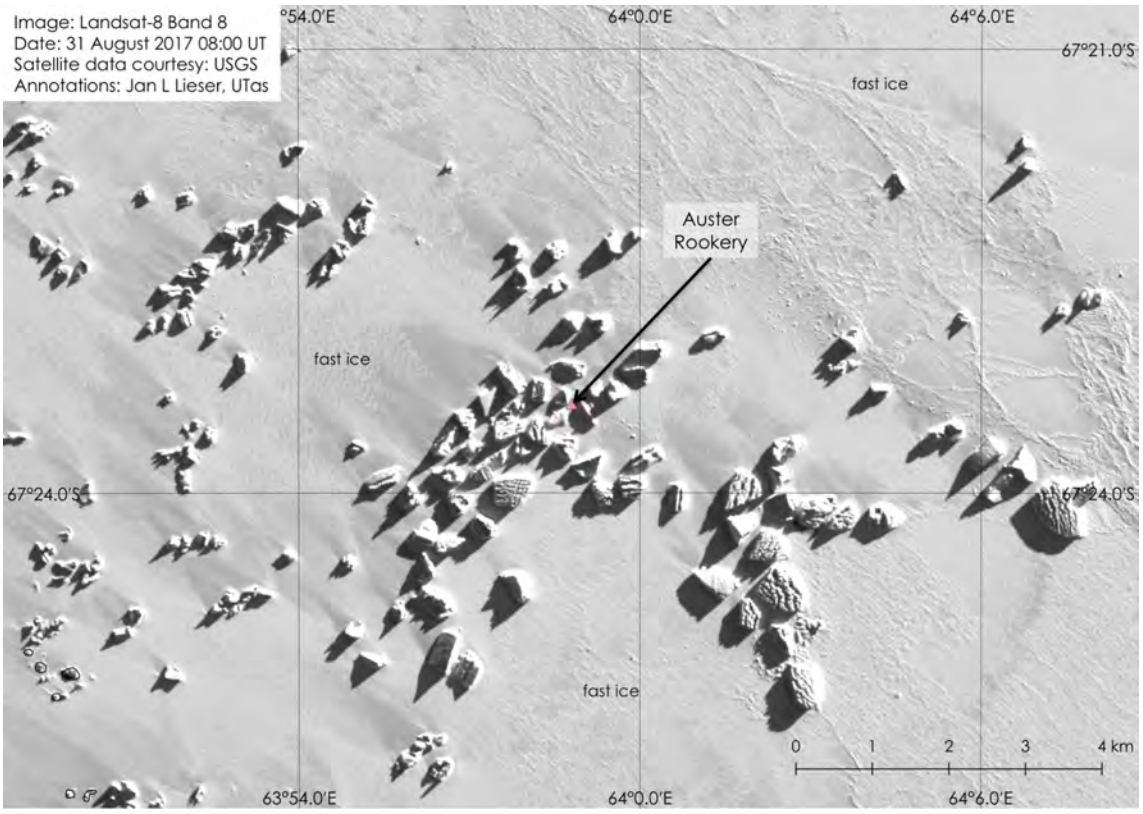

Figure 2: Landsat-8 panchromatic (OLI Band 8) scene acquired 31/08/2017 and provided by USGS.

Many grounded icebergs are enclosed by fast ice and local wind-scouring can be seen on the fast ice, which appears to have no thick snow cover between the bergs. In the northeastern part of the figure, more deformed fast ice can be found (which is likely accumulated pack ice and has not formed in situ) with more snow on top.

Sabrina Coast

Figure 3 shows a high resolution SAR scene of Sabrina Coast and offshore.

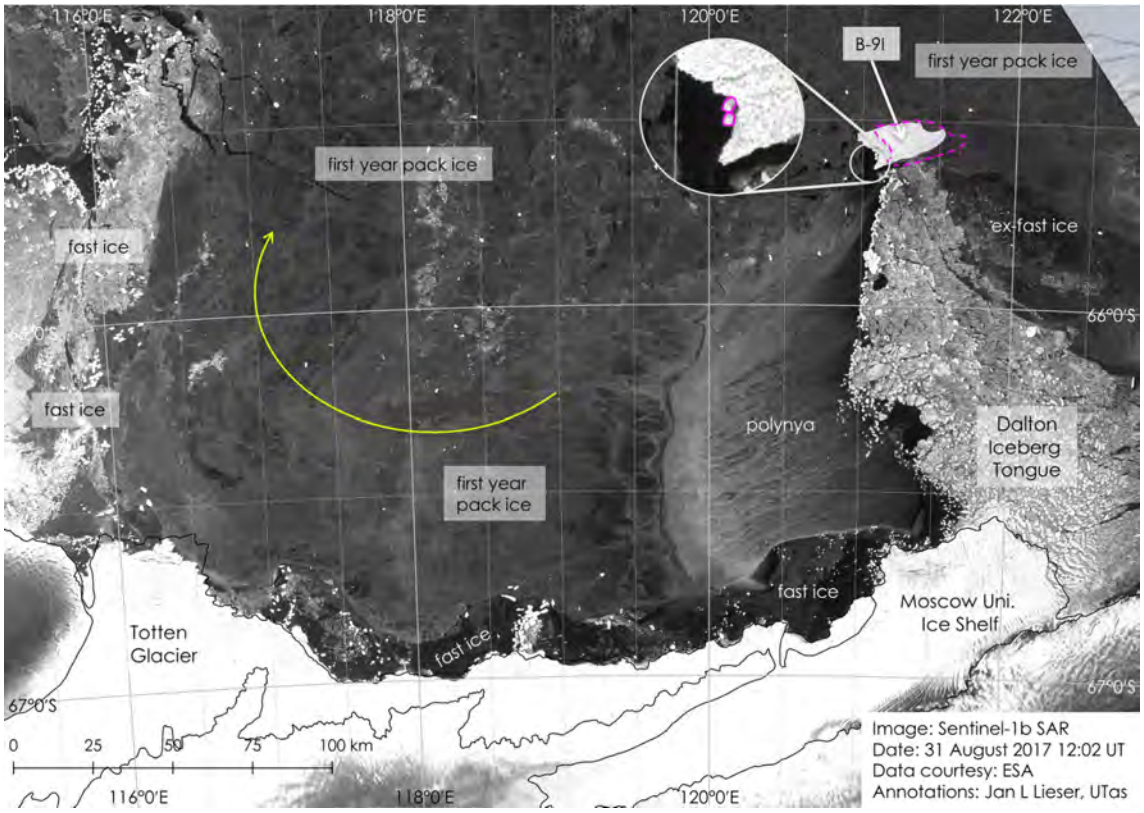

Figure 3: Sentinel-1b SAR data acquired 31/08/2017 at 12:02 UT and provided by PolarView.

The position of iceberg B-9I on 29/08/2017 is given by the dashed, pink shape. Since then, the iceberg has moved roughly 2.5 km westward and dislodged the two northernmost icebergs of the Dalton Iceberg Tongue (of 0.85 km^2 and 0.64 km^2, see pink shapes in magnified area of Figure 3).

West of the Dalton Iceberg Tongue, the polynya seems well developed and forming sea ice accumulates on its western edge. Off Totten Glacier, the clockwise drift of first-year sea ice continues (indicated by the yellow arrow).

D'Urville Sea

Figure 4 shows a visible scene of Commonwealth Bay, off Cape Denison.

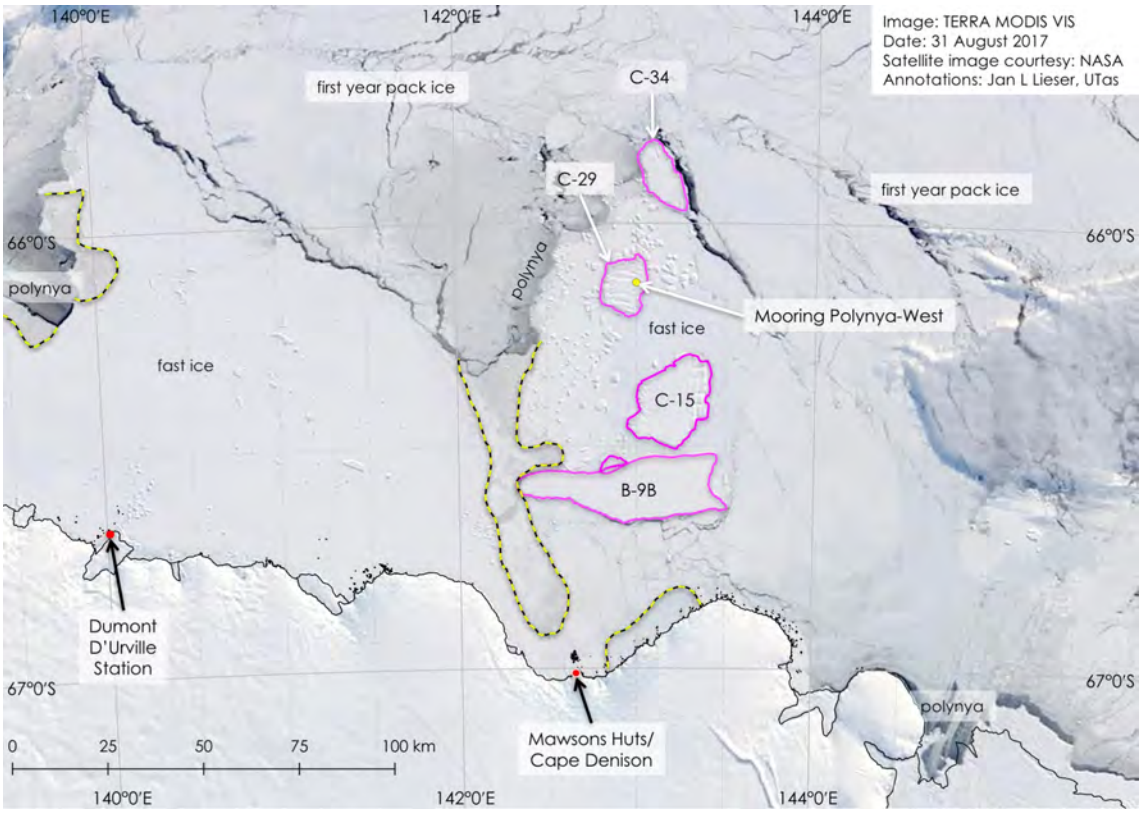

Figure 4: TERRA MODIS VIS data acquired 31/08/2017 and provided by NASA.

The configuration of icebergs north of the bay is largely unchanged. Between Cape Denison and iceberg B-9B, sea ice is breaking up. As a result of the movements of iceberg B-9B since April 2017, it is now roughly 10 km further north (measured due north).

Areas of thin sea ice are loosely marked by black-yellow scribble lines, which show that the sea ice of Commonwealth Bay is still mobile while some new ice forms under calm conditions. At the fast-ice edge north of Dumont D'Urville Station, the thinner sea ice indicates a weakening of the edge.

Sea Ice Report #37.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

04/09/2017

Antarctica

Figure 1 shows a sea-ice concentration chart around Antarctica. The yellow line marks the median sea-ice extent for September.

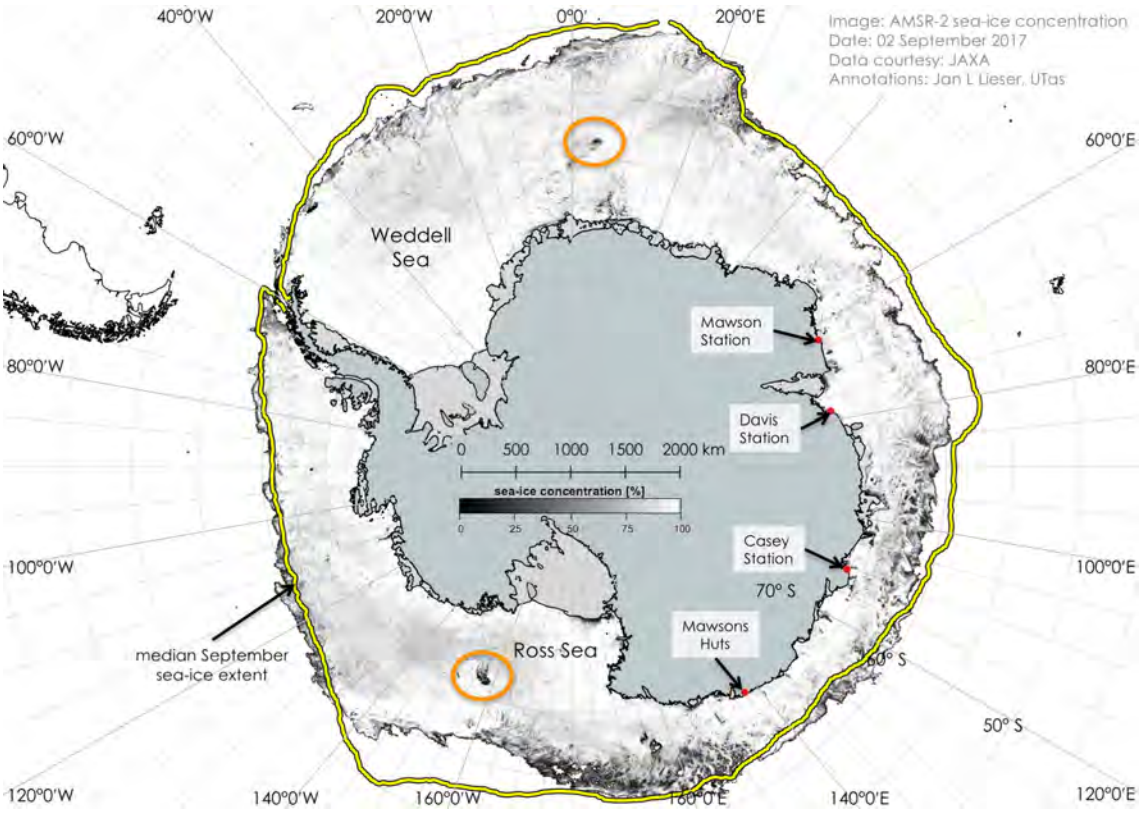

Figure 1: Sea-ice concentration chart data acquired 02/09/2017 and provided by ICDC/Universität Hamburg.

In early September, sea ice is already largely confined within the bounds of the September-median extent. Of particular note are two regions in the western Weddell Sea and western Ross Sea (marked by orange circles) that show almost ice-free patches in the central pack ice.

Between 85° E and 110° E, below median extent sea-ice shows also low to very low sea-ice concentration in the marginal ice zone. The same – and to a larger degree – is true west of 150° E, which extends into a large region of ice free ocean (more than 750 000 km^2) in the western Ross Sea.

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Davis Station

Figure 2 shows a high-resolution SAR scene of Sørsdal Glacier and the Vestfold Hills north of it and the Rauer Group south of it.

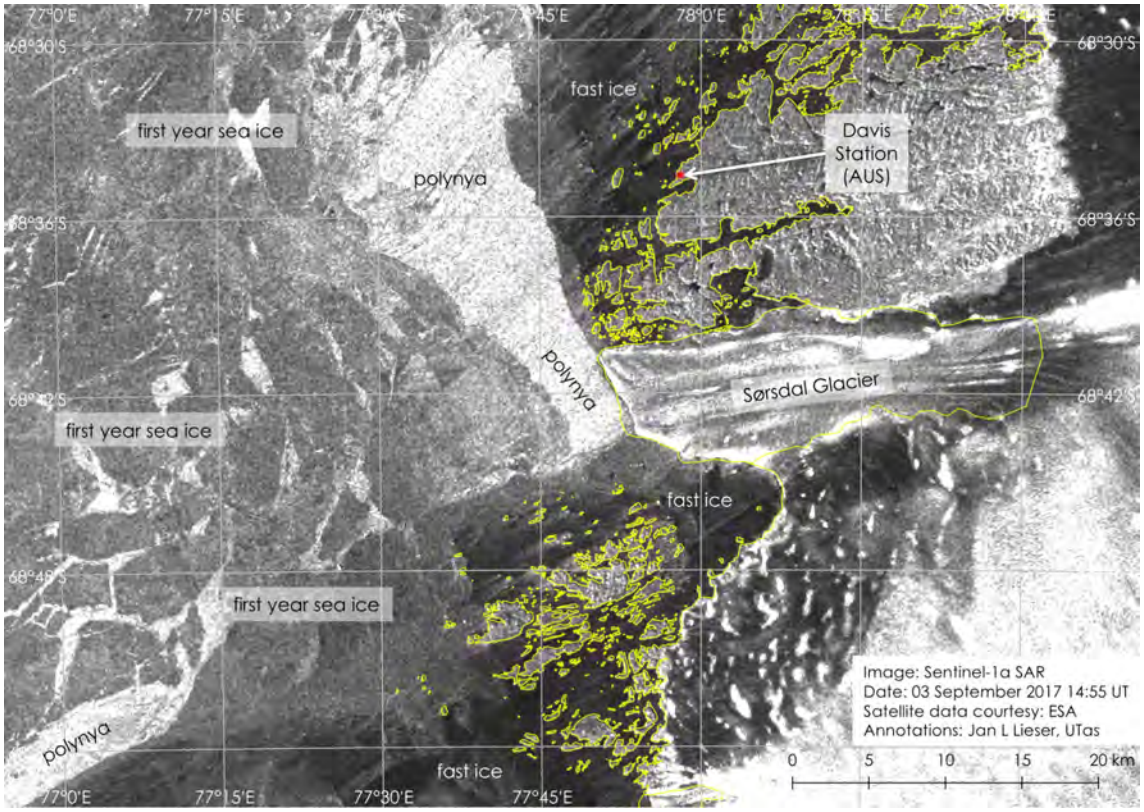

Figure 2: Sentinel-1a SAR data acquired 03/09/2017 at 12:02 UT and provided by PolarView.

Fast ice remains attached to islands off the Vestfold Hills and a large polynya has formed again. The western front of the Sørsdal Glacier remains free of sea ice.

Further offshore, first year pack ice is breaking up and southwest of the Rauer Group (outside the frame of Figure 2) sea ice that was temporarily land-locked between the Amery Ice Shelf and Ingrid Christensen Coast has now large leads and many openings.

Sabrina Coast

Figure 3 shows a visible scene of Sabrina Coast and offshore.

The position of iceberg B-9I on 31/08/2017 is given by the dashed, pink shape. Since then, the iceberg has rotated anti-clockwise roughly 35 degrees.

West of the Dalton Iceberg Tongue, the polynya seems well developed and forming sea ice accumulates on its western edge. Off Totten Glacier,

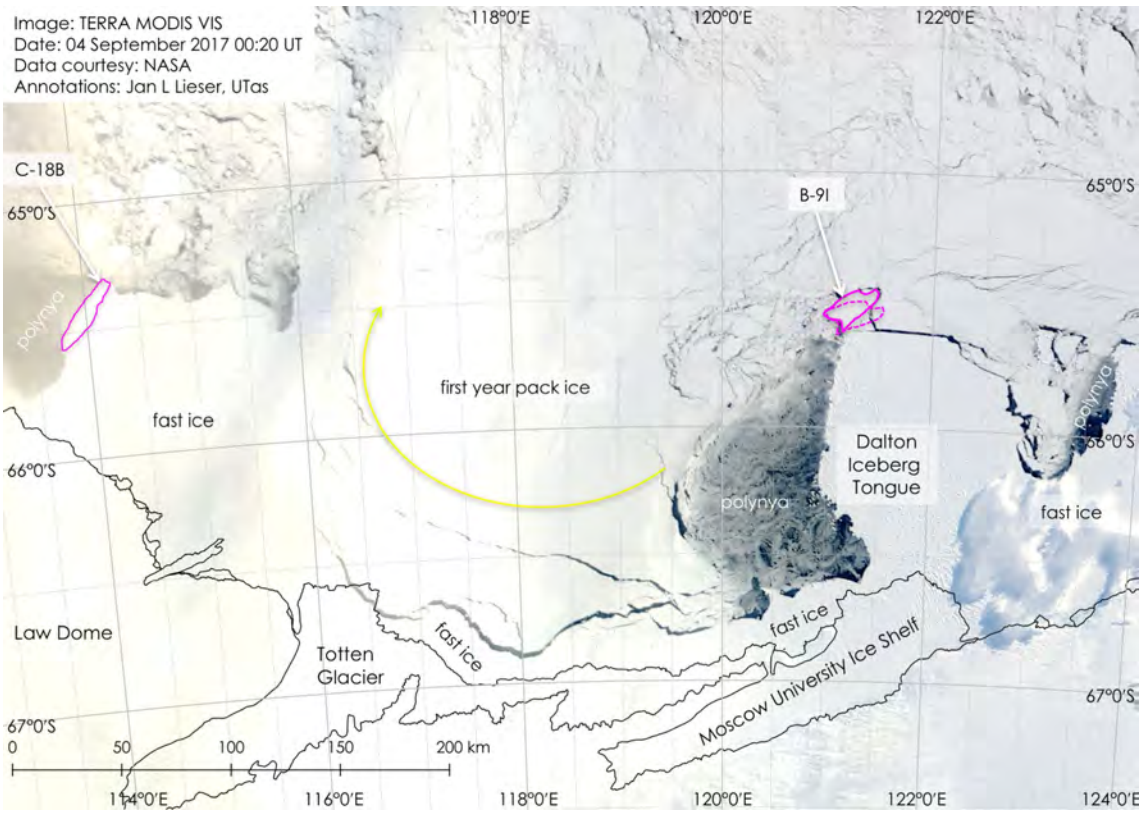

Figure 3: TERRA MODIS VIS scene acquired 04/09/2017 and provided by NASA.

the clockwise drift of first-year sea ice continues. The rotational movement (indicated by the yellow arrow) has created two large leads, one along the fast-ice edge and another one stretching from the Moscow University Ice Shelf to the northern part of fast ice off Totten Glacier, which appears to be along a major shear zone within the first-year pack ice.

Sea Ice Report #37.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

07/09/2017

Cape Darnley

Figure 1 shows a visible scene of Cape Darnley.

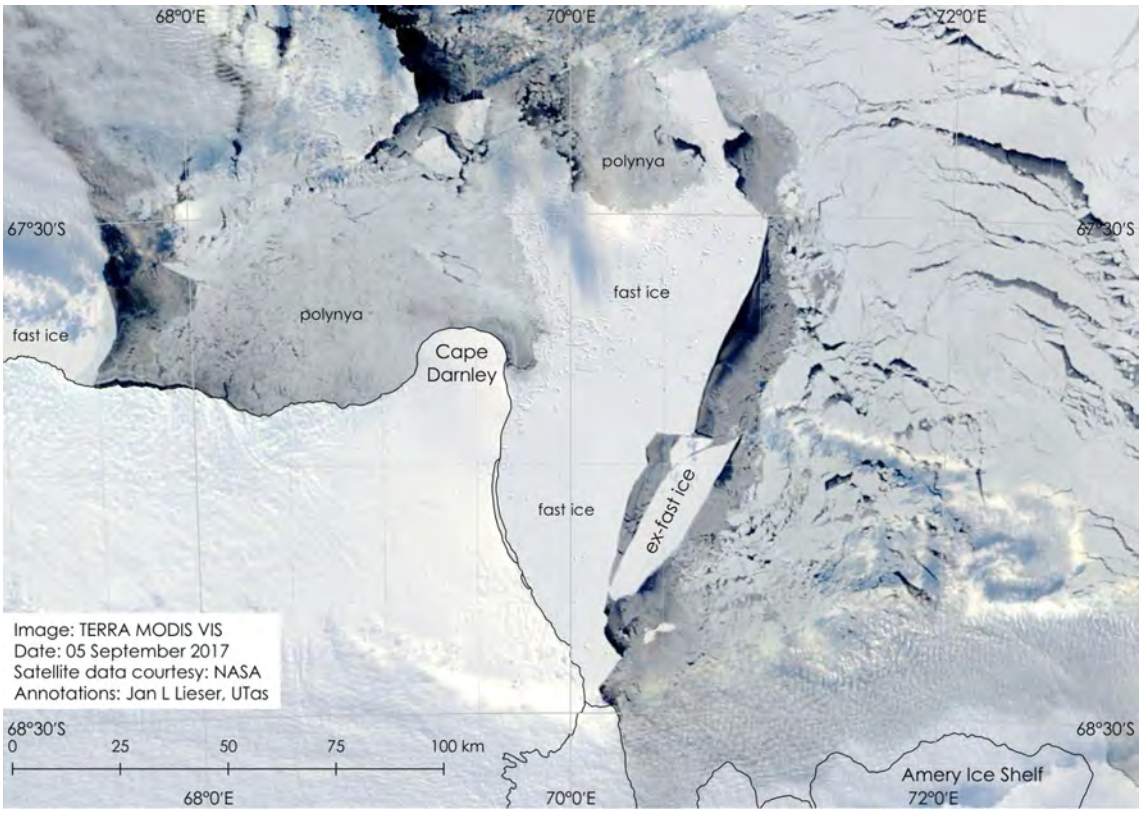

Figure 1: TERRA MODIS VIS scene acquired 05/09/2017 and provided by NASA.

On 04/09/2017, roughly 385 km^2 of fast ice broke away from the main body of fast ice northwest of the Amery Ice Shelf. Also, north of Cape Darnley, fast ice is breaking up and two large floes of ex-fast ice can be seen at 69° 30' E and 67° 20' S.

Davis Station

Figures 2 and 3 show the same geographical frame of Sørsdal Glacier and the Vestfold Hills north of it, and the Rauer Group south of it as seen by Sentinel-1a SAR and Suomi-NPP VIIRS Day-Night-Band, respectively.

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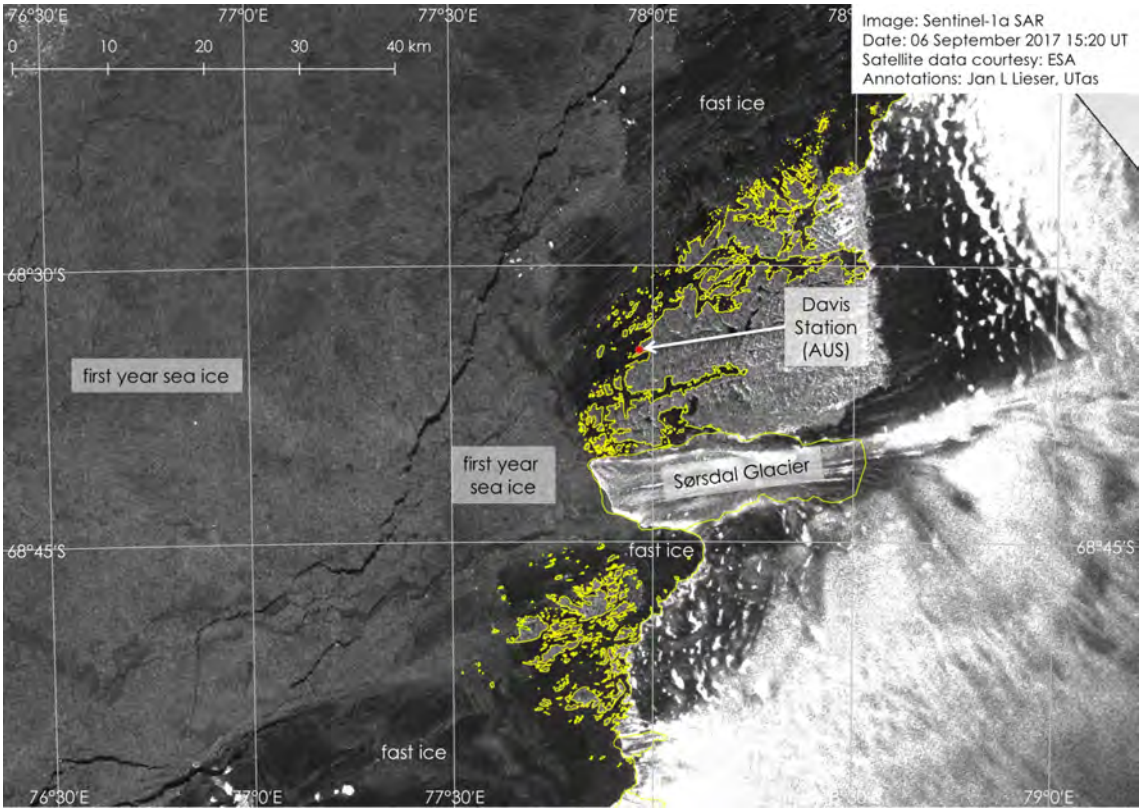

Figure 2: Sentinel-1a SAR data acquired 06/09/2017 at 15:20 UT and provided by PolarView.

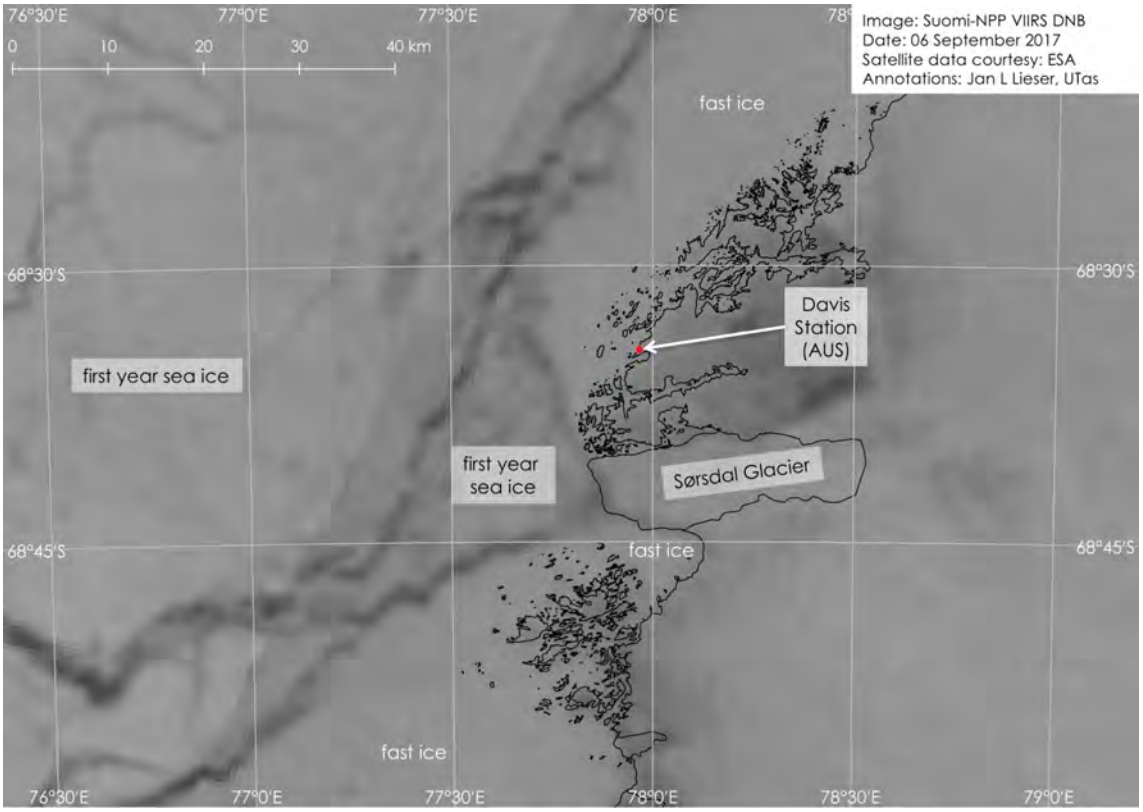

Figure 3: Suomi-NPP VIIRS panchromatic scene acquired 06/09/2017 and provided by NASA.

Recent weather conditions have pushed first-year sea ice against the coast and the fast-ice edge offshore. Some large cracks remain, as can be seen in both the SAR and the panchromatic imagery. The difference in the width of those cracks can be attributed to the time lag of the two acquisitions (a couple of hours) and is indicative for the highly dynamic behaviour of sea ice in the region.

Sabrina Coast

Figure 4 shows a SAR scene offshore Sabrina Coast.

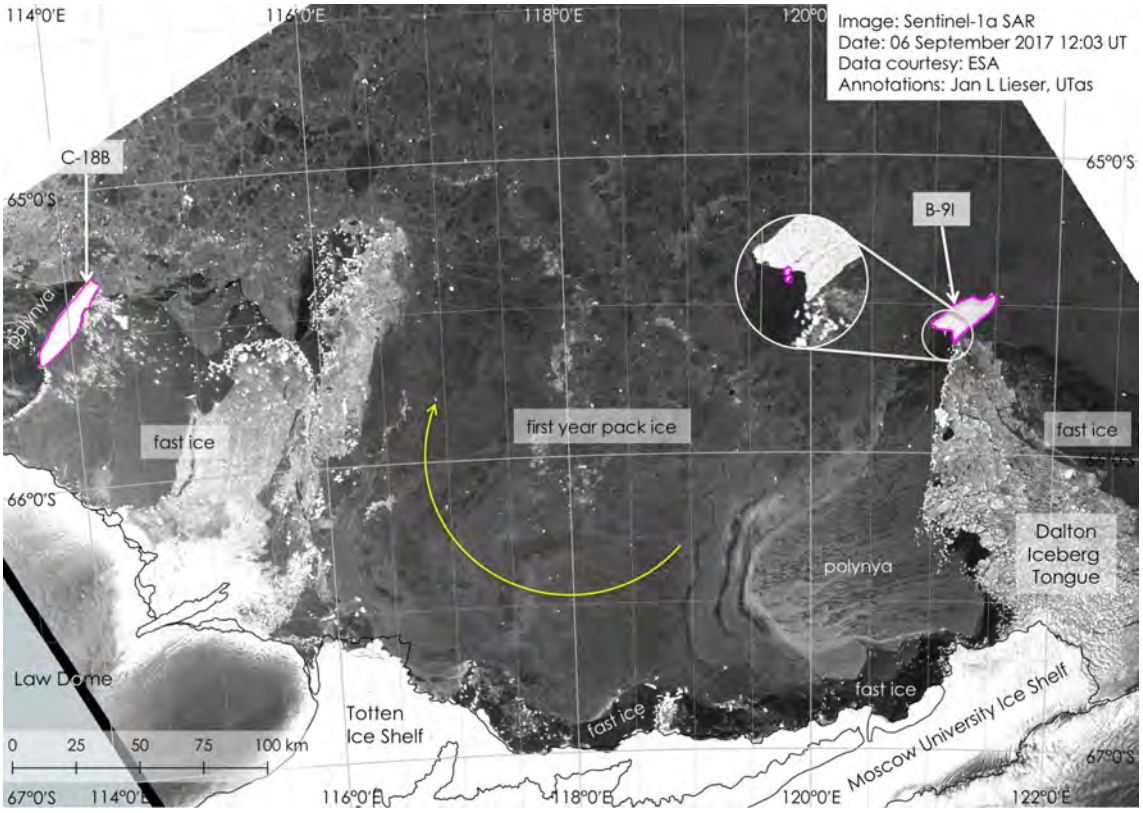

Figure 4: Sentinel-1a SAR data acquired 06/09/2017 at 12:03 UT and provided by PolarView.

During the past four days, iceberg B-9I has not moved significantly and remains wedged in between two icebergs north of the Dalton Iceberg Tongue and the northern tip of the tongue (magnified area in Figure 4). The polynya to the west of the tongue measures currently 5300 km^2.

Sea Ice Report #38.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

13/09/2017

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for August 2017.

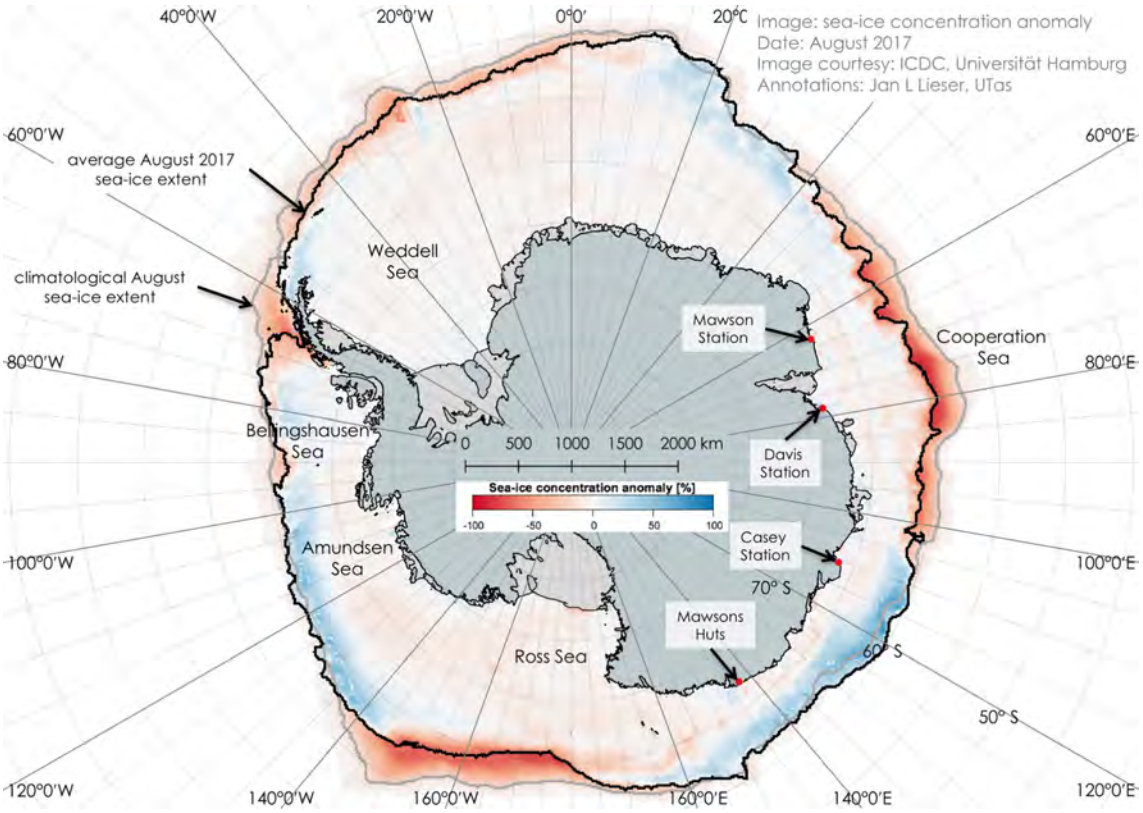

Figure 1: Sea-ice concentration anomaly of August 2017 provided by ICDC, Universität Hamburg.

The trend of lower than average sea-ice concentration continues around the continent with Cooperation Sea and eastern Ross Sea showing the most pronounced negative values and the northwestern Antarctic Peninsula and the Weddell Sea also below average.

Between 10° E and 40° E, as well as between 105° E and 160° E and in the Amundsen Sea, a slightly positive concentration anomaly in the marginal ice zone does not counterbalance the overall below average picture.

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Sabrina Coast

Figures 2 shows a high-resolution SAR scene off Sabrina Coast.

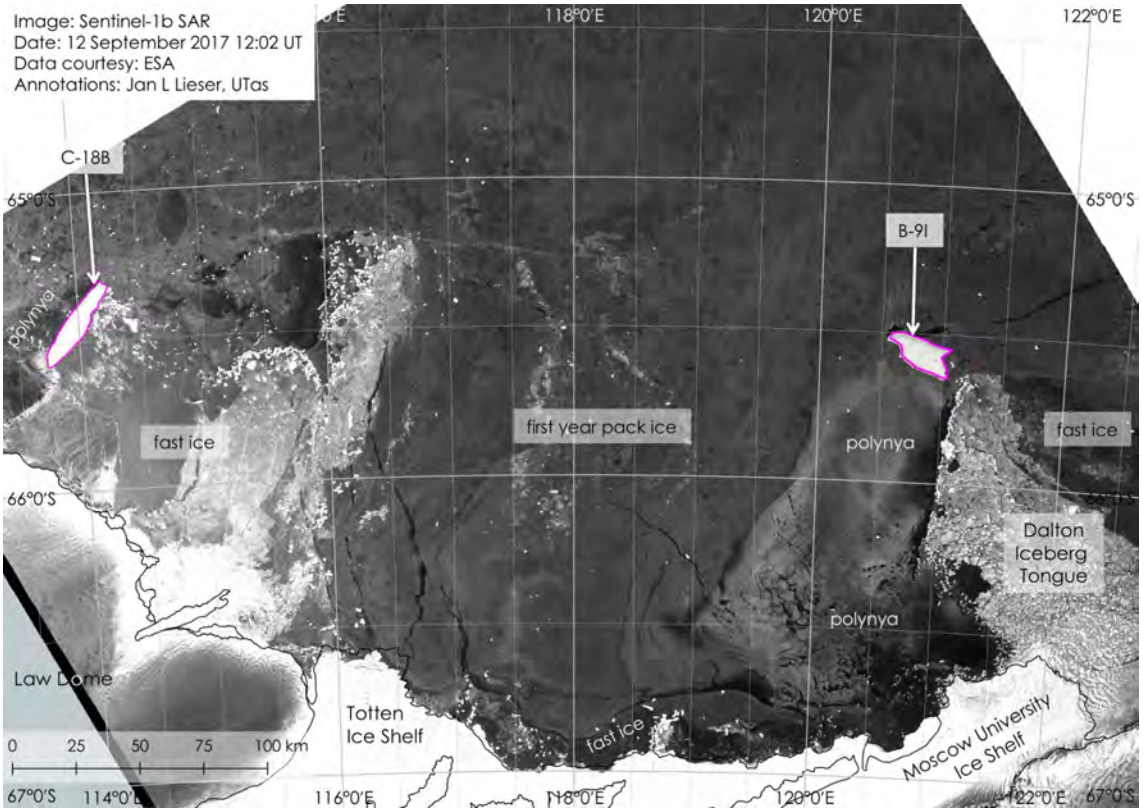

Figure 2: Sentinel-1b SAR data acquired 12/09/2017 at 12:02 UT and provided by PolarView.

While the general icescape has not changed significantly since early September, iceberg B-9I has rotated 110 degrees anti-clockwise and unhinged itself from the two northernmost icebergs of the Dalton Iceberg Tongue, after pushing those two bergs approximately 2.5 km westward.

D'Urville Sea

Figure 3 shows a very high-resolution SAR (interferometric wide swath mode) scene off D'Urville Sea.

Off Cape Denison and the Mertz Glacier Tongue (in the southeastern corner of Figure 3), open water polynyas are currently frozen over, but three of the four large icebergs in the region are still moving very slightly. Iceberg B-9B has shifted roughly 1.8 km west-southwestward, while iceberg C-15 rotated approximately 12 degrees anti-clockwise and moved roughly 3.5 km westward (as well as the triangular iceberg fragment between the two bergs). Iceberg C-29 has not moved but iceberg C-34 has travelled roughly 3 km west-northwestward.

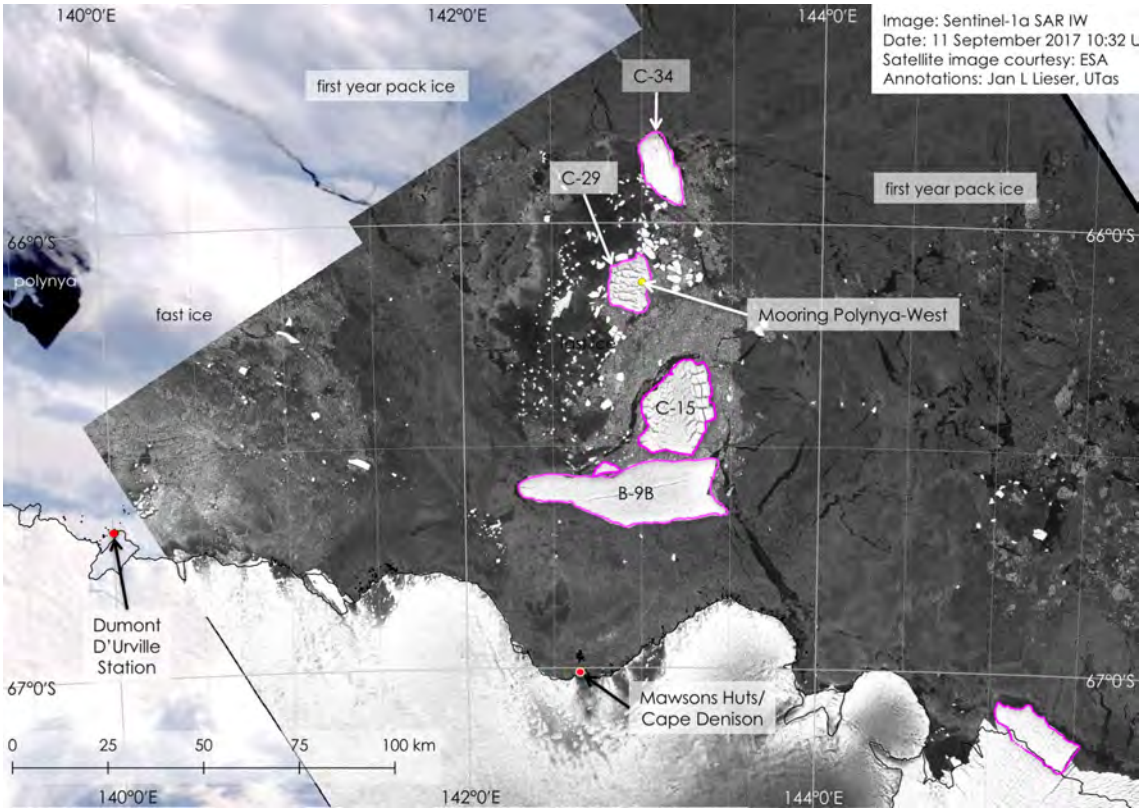

Figure 3: Sentinel-1a SAR data acquired 11/09/2017 at 12:03 UT and provided by PolarView.

On the northwestern corner of the Mertz Glacier Tongue, a 'loose tooth' remains connected to the tongue only by a small ice link of about 5 km (dotted pink line).

Sea Ice Report #39.1/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

18/09/2017

Davis Station

Figure 1 shows a visible scene of Sørsdal Glacier and the Vestfold Hills north of it, and the Rauer Group south of it. A red scribble line marks the fast-ice edge.

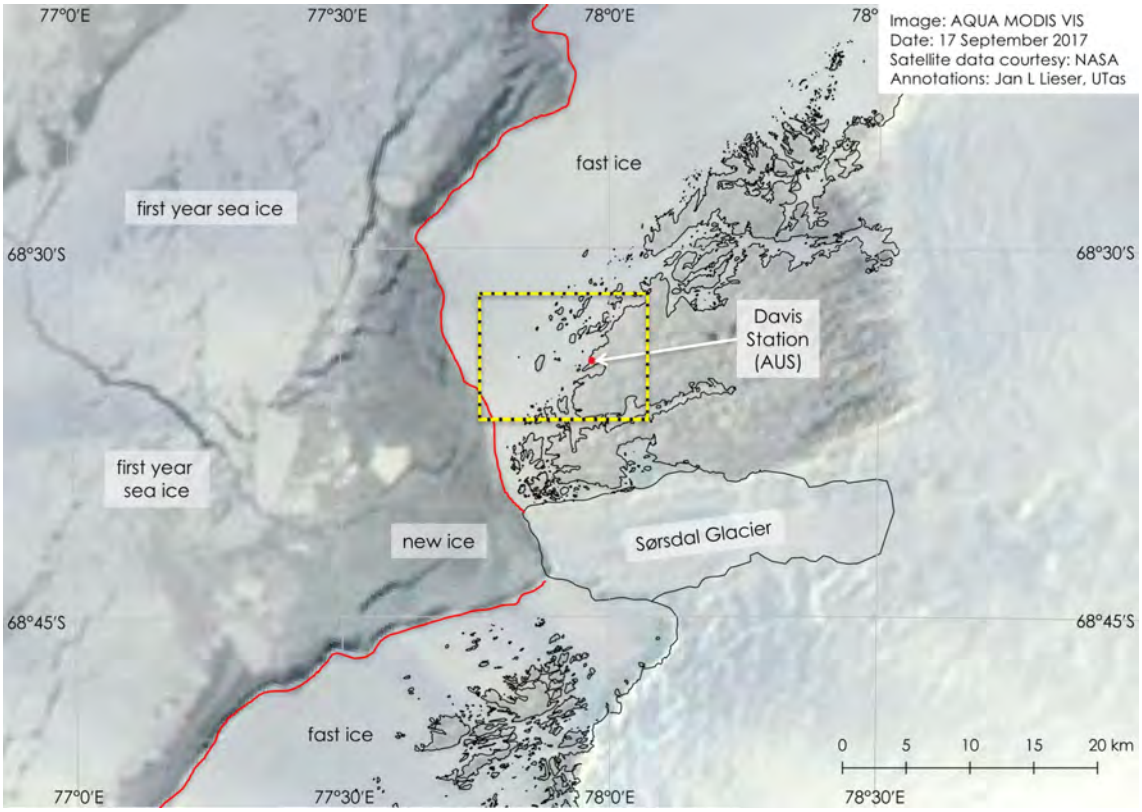

Figure 1: AQUA MODIS VIS data acquired 17/09/2017 and provided by NASA.

Fast ice remains attached to islands off the Vestfold Hills and newly formed sea ice covers the polynya offshore. The fast-ice edge has been relatively stable throughout most of September.

Figure 2 shows a very high-resolution (15 m) panchromatic close-up scene of Davis Station and offshore (approximated by the yellow/black frame in Figure 1).

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In the northern and western part of the figure, shadows of clouds can be seen as dark patches. Between the offshore islands, a few icebergs can be seen enclosed by fast ice.

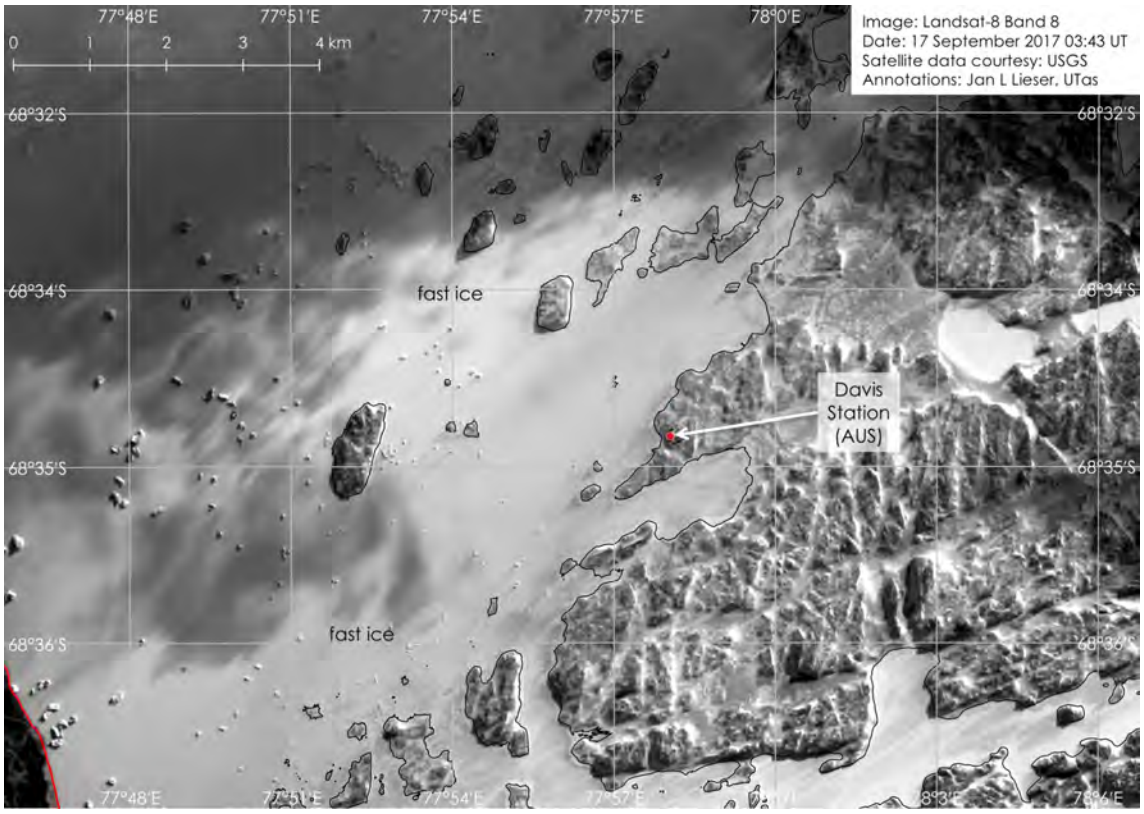

Figure 2: Landsat-8 panchromatic data acquired 17/09/2017 at 03:42 UT and provided by USGS.

Sea Ice Report #39.2/2017

by the Antarctic Gateway Partnership Sea Ice Service*
Analyst: Jan L Lieser

21/09/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart for East Antarctica. The yellow line denotes the median sea-ice extent for September. Pink dots mark the locations of large tabular icebergs.

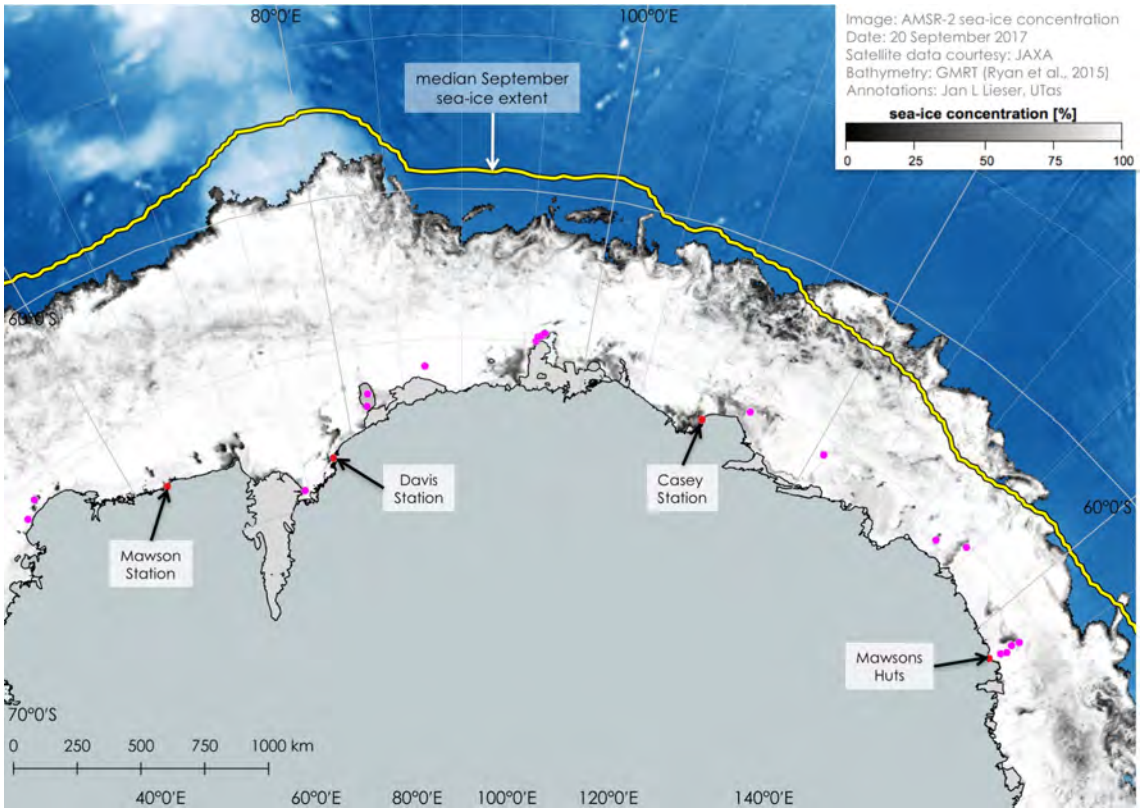

Figure 1: Sea-ice concentration chart, data acquired 20/09/2017 and provided by ICDC, Universiät Hamburg.

Lower than average sea-ice extent is prevalent in the region. Only between 115° E and 135° E, sea ice can be found north of the median extent.
Off Australian Antarctic stations fast-ice conditions appear, as is to be expected at this time of year. Northwest of Mawson Station, a polynya is approximately 32 nautical miles away, while off Davis Station the fast-ice edge is roughly 5.5 nautical miles west of the station. Offshore Casey Station, only young and thin fast ice is present.

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Sea Ice Report #41.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

03/10/2017

Mawson Station

Figure 1 shows a very high-resolution (15 m) visible scene off Mawson Station, complemented by AQUA MODIS VIS data in the west.

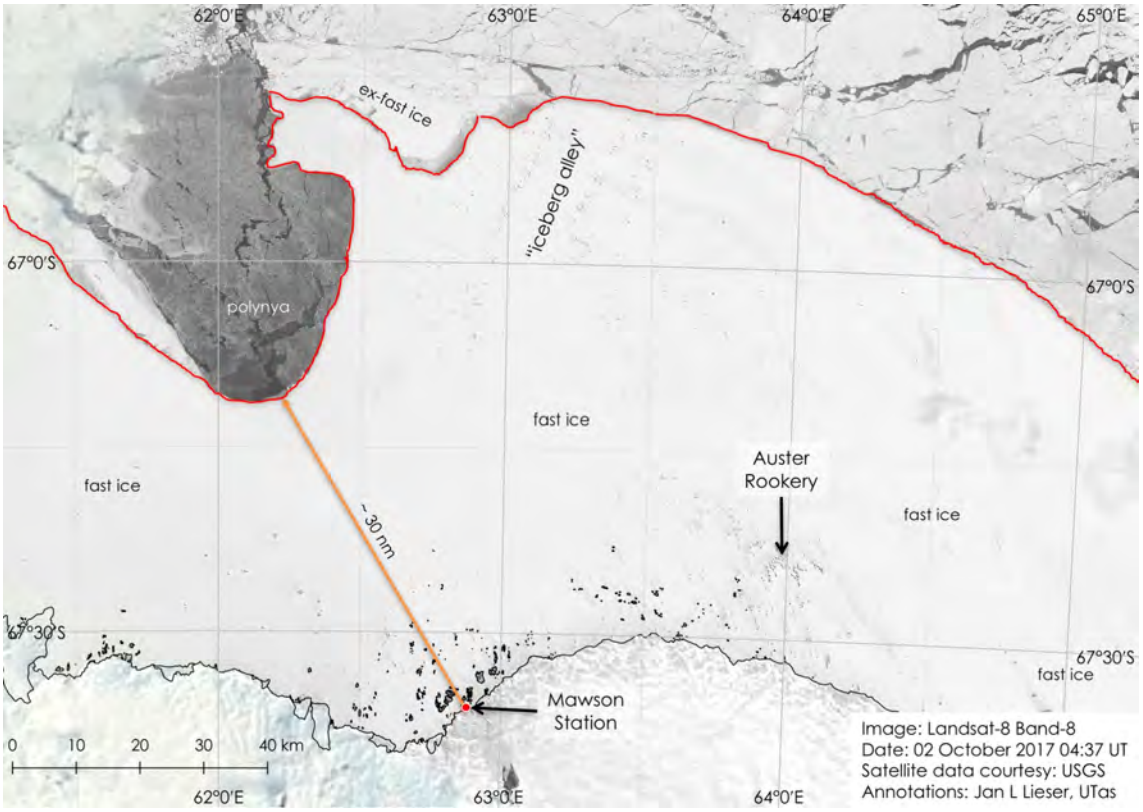

Figure 1: Landsat-8 panchromatic scene (Band 8) acquired 02/10/2017 at 04:37 UT and provided by USGS.

Northwest of the station, the polynya is covered by newly formed, thin sea ice and the fast-ice edge is roughly 30 nautical miles away. Some fast ice is breaking away from the northern fast-ice edge, as can be seen between 62° E and 63° E and west of 62° E, too.

Due north of Mawson Station, the sea-ice edge is approximately 440 nautical miles away, which is roughly 100 nautical miles less then the long-term median sea-ice extent for October.

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Davis Station

Figure 2 shows a visible scene between the Amery Ice Shelf and the West Ice Shelf.

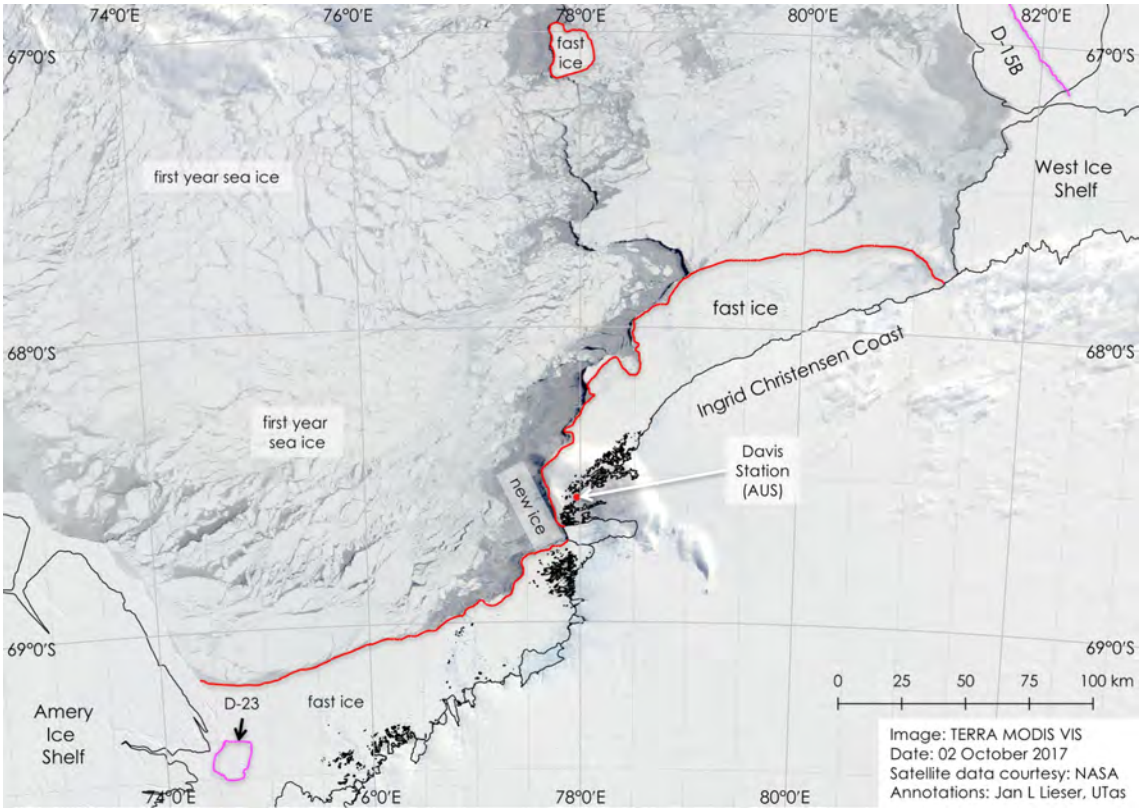

Figure 2: TERRA MODIS VIS scene acquired 02/10/2017 and provided by NASA.

Prydz Bay (north of iceberg D-23) is covered by first-year sea ice and new, thin ice off the fast-ice edge. North of Ingrid Christensen Coast, some fast ice is locked between grounded icebergs, but not land-fast.
West of Davis Station, the fast-ice edge is roughly 6 nautical miles away.

D'Urville Sea

Figure 3 shows a visible scene between Dumont D'Urville Station and the Mertz Glacier. The fast-ice edge is marked by a solid red line. Sea ice that is only temporarily attached to the fast ice is marked by a dashed, red line. North of Cape Denison, the overall configuration of four large, tabular icebergs (marked by pink outlines) has not changed significantly since mid-September.

Iceberg A-68A

Figure 4 shows a SAR scene of Larsen-C Ice Shelf and the recently calved iceberg A-68A, which is at its southern end, now separated from the shelf by 40 km (yellow arrow in Figure 4).

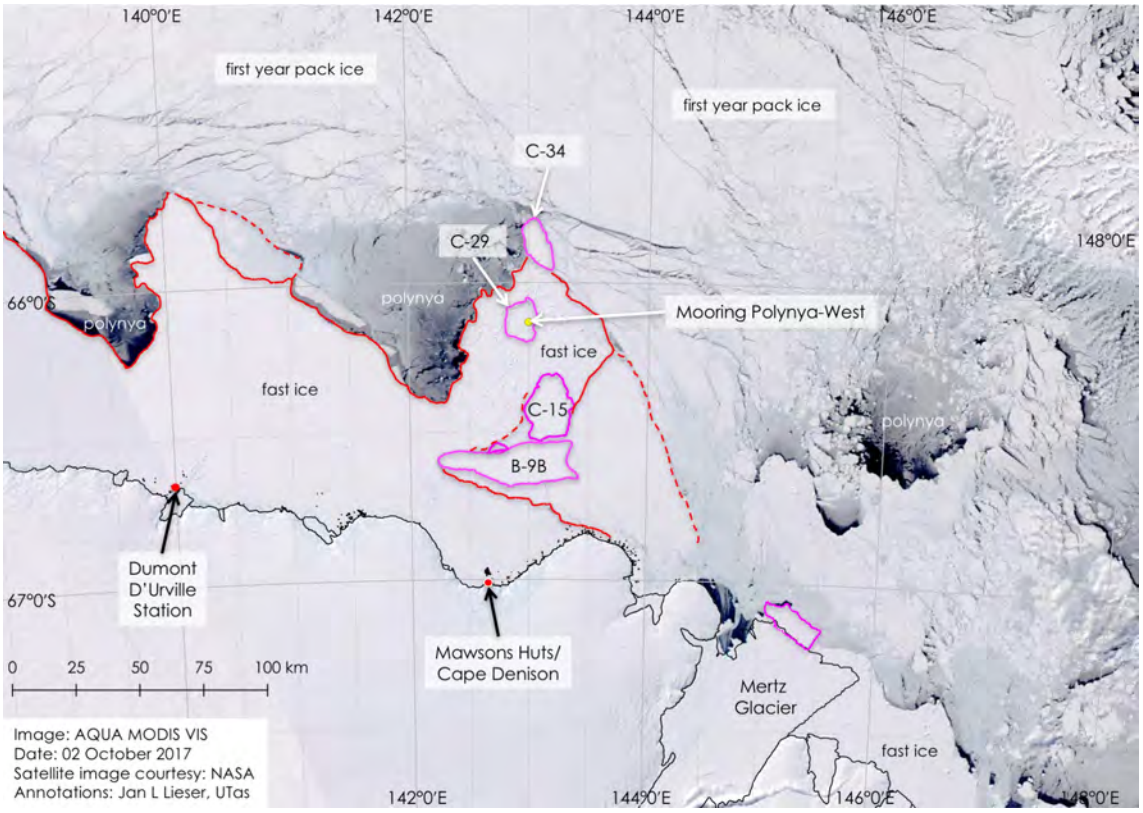

Figure 3: AQUA MODIS VIS scene acquired 02/10/2017 and provided by NASA.

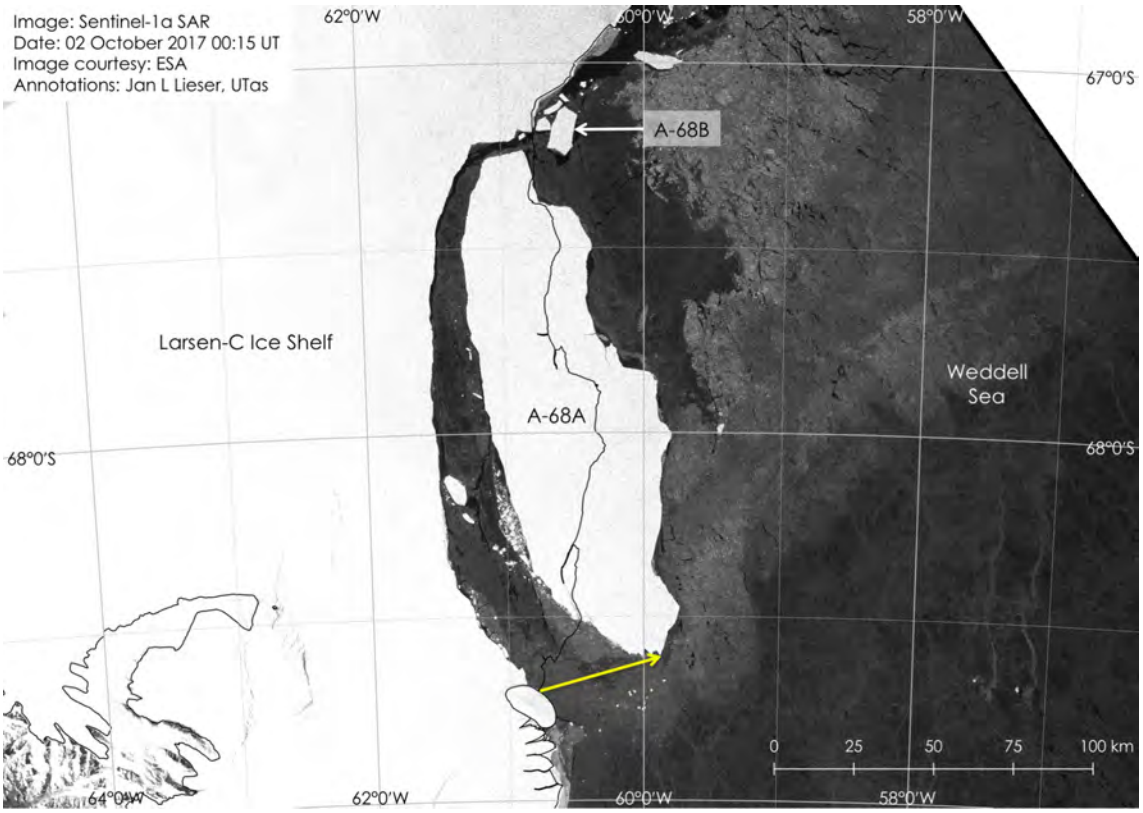

Figure 4: Sentinel-1a SAR scene acquired 02/10/2017 at 00:15 UT and provided by PolarView.

Sea Ice Report #41.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

04/10/2017

Antarctica

Figure 1 shows a high-resolution sea-ice concentration chart of Antarctica.

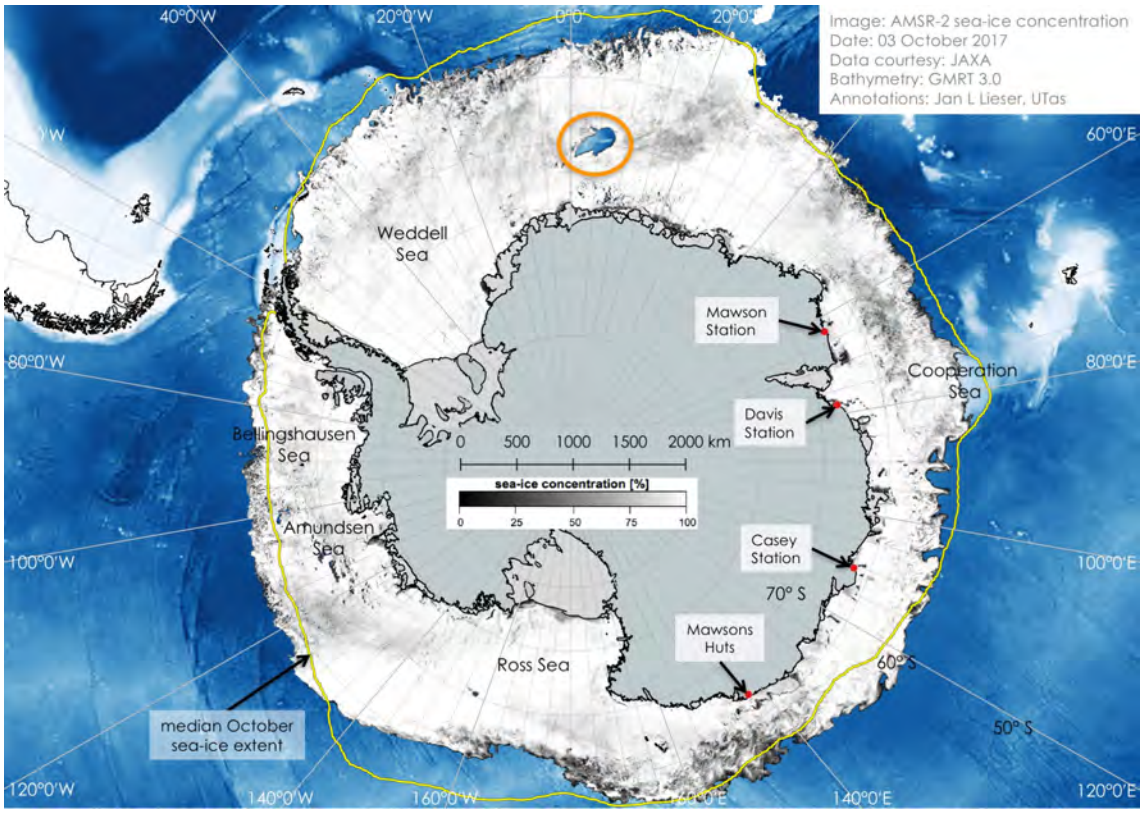

Figure 1: Sea-ice concentration chart, acquired 03/10/2017 provided by ICDC, Universität Hamburg.

The general pattern of slightly above and well below average sea-ice extent remains around the continent. The Weddell Sea, Cooperation Sea and Ross Sea exhibit sea-ice extent below (south of) the median sea-ice extent, which is in the overall picture not compensated for by slightly above (north of) median sea-ice extent between 115° E and 140° E and in the Bellingshausen Sea and Amundsen Sea.
Also of note is the persistence of areas of open water within the sea-ice extent, which leads to low sea-ice area values. The so-called Maud Rise Polynya (orange circle) covers currently roughly 50 000 km^2. Smaller open water areas are observed in the Amundsen Sea and Ross Sea as well.

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Sea Ice Report #41.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

06/10/2017

Davis Station

Figure 1 shows a composite of high-resolution visible channels of Davis Station and vicinity.

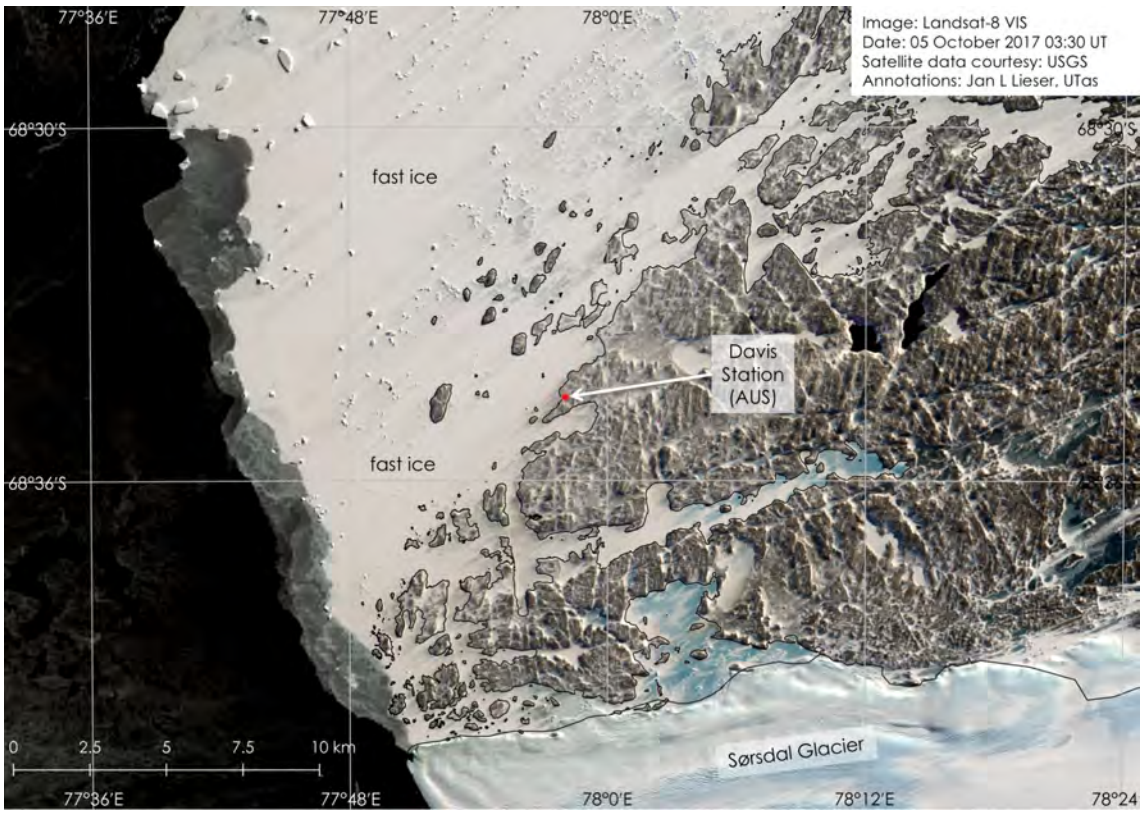

Figure 1: Landsat-8 visible composite acquired 05/10/2017 at 03:30 UT and provided by USGS.

Off the Vestfold Hills, fast ice remains between icebergs. Off the fast-ice edge, a margin of thin sea ice is attached and nilas is found further offshore. The fast-ice edge is 10 km west of the station.

North of Sørsdal Glacier, fast ice is only present between the offshore islands.

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Casey Station

Figure 2 shows a high-resolution SAR scene of Casey Station and vicinity.

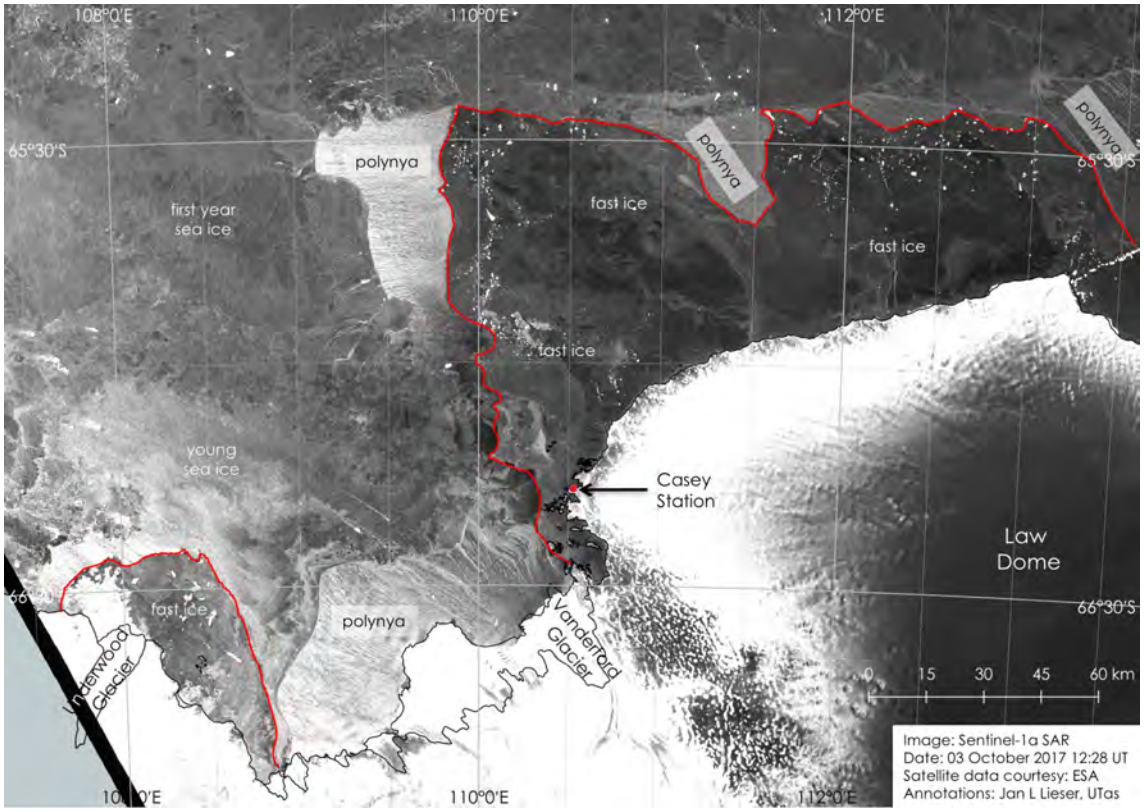

Figure 2: Sentinel-1a SAR scene acquired 03/10/2017 at 12:28 UT provided by PolarView.

Off Casey Station, a mixture of accumulated pack ice and older fast ice in the north puts the fast-ice edge approximately 9 km west of the station. Vincennes Bay, between Underwood Glacier and Vanderford Glacier, is partly covered by young sea ice and partly polynya with some fast ice off Underwood Glacier.

Sea Ice Report #42.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

11/10/2017

Cooperation Sea

Figure 1 shows a high-resolution sea-ice concentration chart of Cooperation Sea, with the median sea-ice extent for October indicated by a yellow/black line.

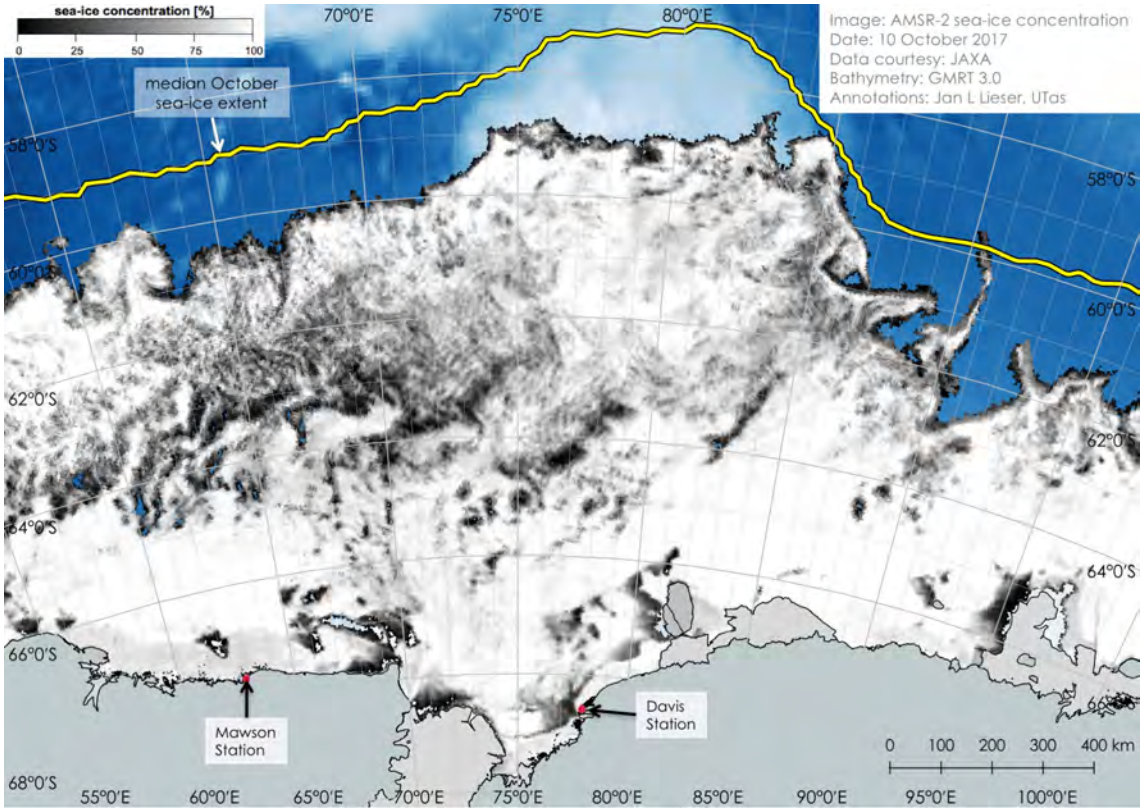

Figure 1: Sea-ice concentration data acquired 10/10/2017 and provided by Universtiät Hamburg.

In the region shown in the figure, the current sea-ice extent is well south of the median, except for one small area around 85° E. Additionally, sea-ice area (the actual cover of sea ice within the extent) in the region appears low, particularly west of 80° E. However, regions of high sea-ice concentration remain closer to the coast.

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Sea Ice Report #42.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

13/10/2017

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for September 2017.

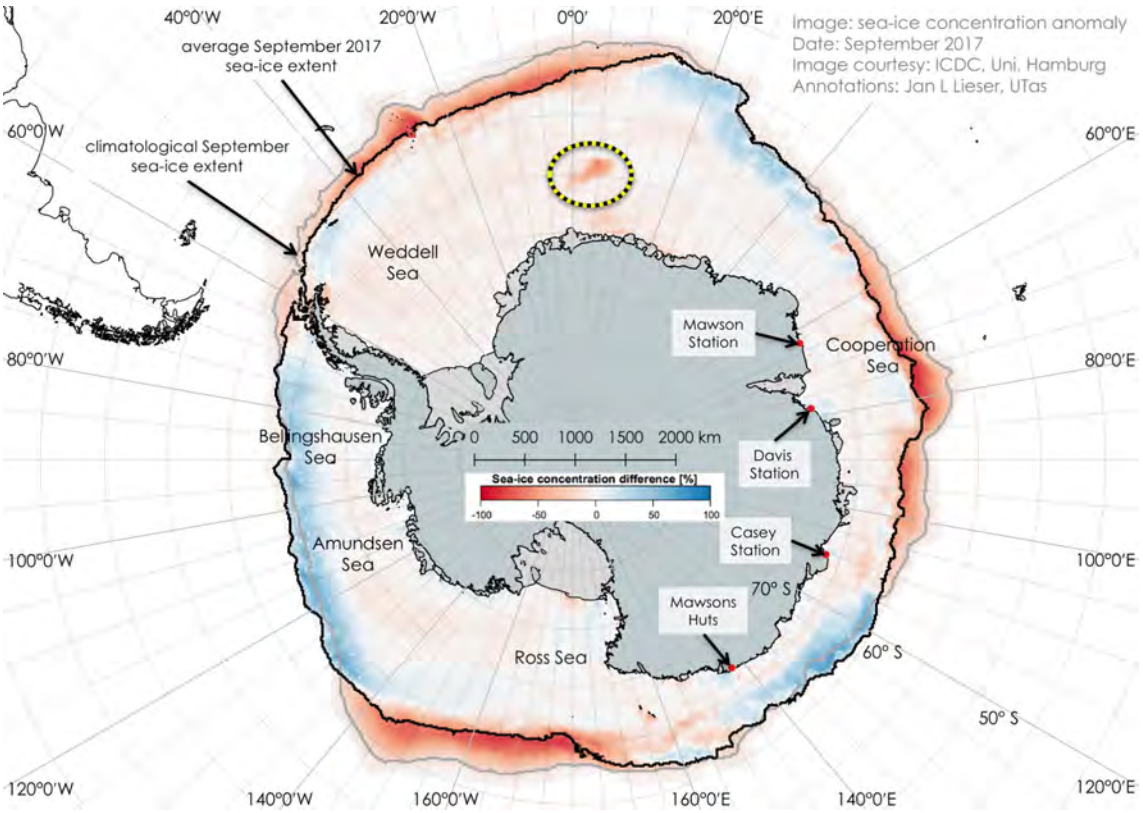

Figure 1: Sea-ice concentration anomaly for September 2017 provided by ICDC, Universtiät Hamburg.

Below average sea-ice concentration continues to dominate the overall picture around Antarctica. Additionally to sea-ice extent generally not reaching as far north as could be climatologically expected, the presence of the Maud Rise Polynya (also referred to as Weddell Polynya), just east of 0° E (black-yellow circle), is a prominent feature in the anomaly chart. This polynya covers an area in excess of 85 000 km^2 in Figure 1.

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Sea-ice extent peaked in mid-September and was going down for most of the rest of the month but has since then reached another peak earlier this week marking the second lowest and the latest sea-ice extent maximum on record.

D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea and the coast between Dumont D'Urville Station and Mertz Glacier.

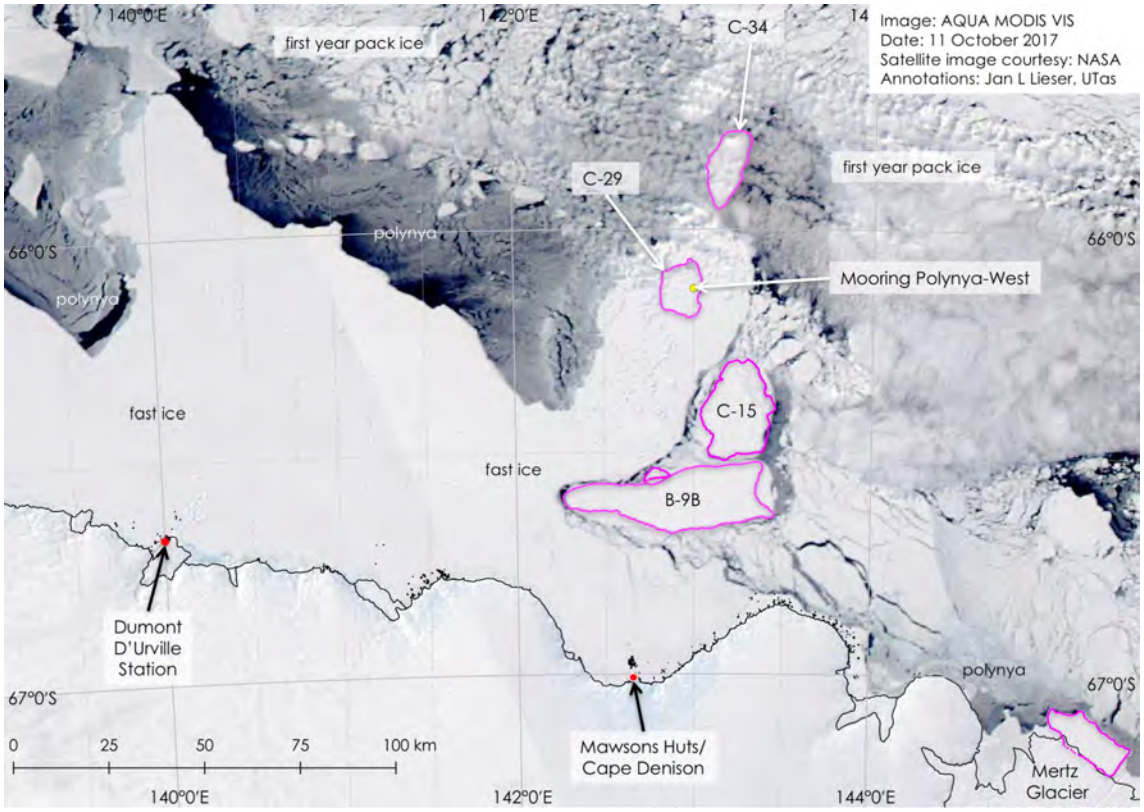

Figure 2: AQUA MODIS VIS scene acquired 11/10/2017 and provided by NASA.

Since early October, icebergs B-9B and C-15 are on the move again. The fast ice east of the bergs has broken and iceberg B-9B has travelled roughly 2 km eastward and rotated slightly anti-clockwise. Iceberg C-34 has shifted approximately 5.5 km eastward and rotated about 25 degrees clockwise.

Sea Ice Report #43.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

18/10/2017

Antarctica

Figure 1 shows a sea-ice concentration chart for Antarctica. The black-yellow line marks the long-term median sea-ice extent for October.

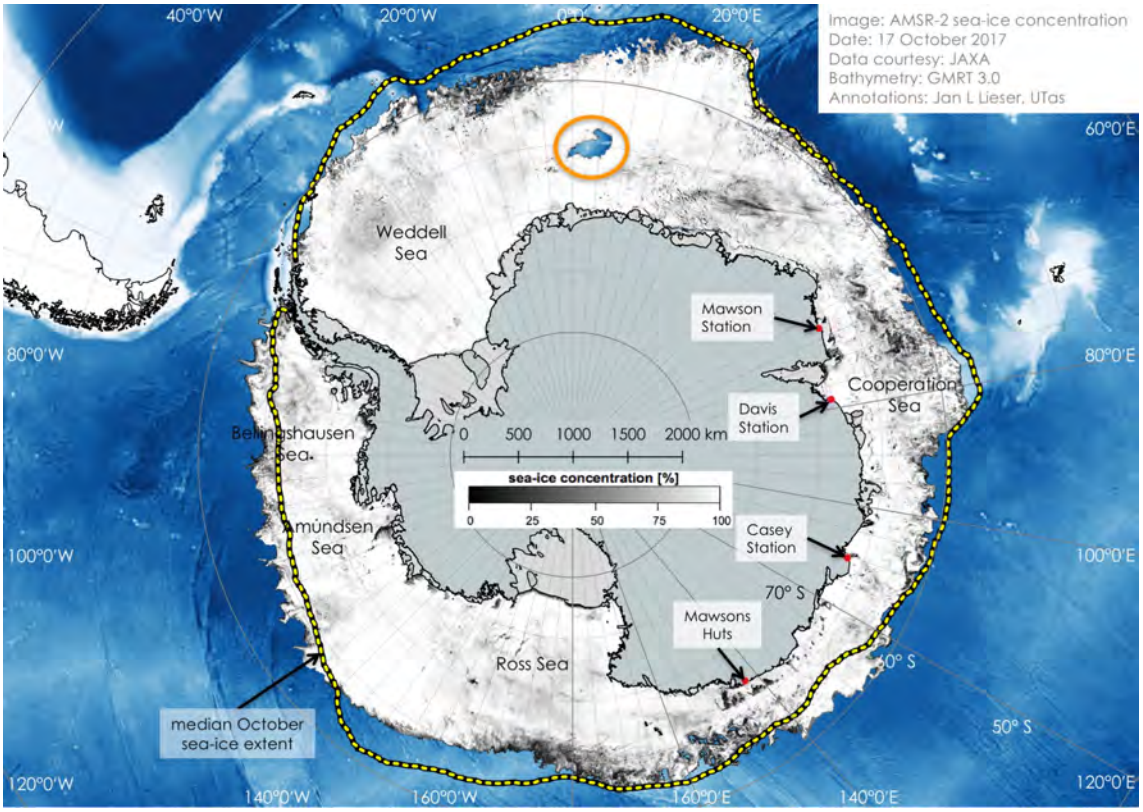

Figure 1: Sea-ice concentration chart acquired 17/10/2017 and provided by ICDC, Universtiät Hamburg.

Below median extent persists almost entirely around the continent. Only in a small region between 120° E and 140° E and in the Bellingshausen Sea and Amundsen Sea, sea ice extends slightly above the October median. Maud Rise Polynya (also referred to as Weddell Polynya), just east of 0° E (orange circle), is still a prominent feature and covers currently an area of roughly 55 000 km^2.

Sea-ice concentration in Cooperation Sea appears low, particularly north of Mawson Station.

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D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea and the coast between Dumont D'Urville Station and Mertz Glacier. The fast-ice edge is marked by a solid red line, major breaks in the fast ice are marked by dashed, red lines.

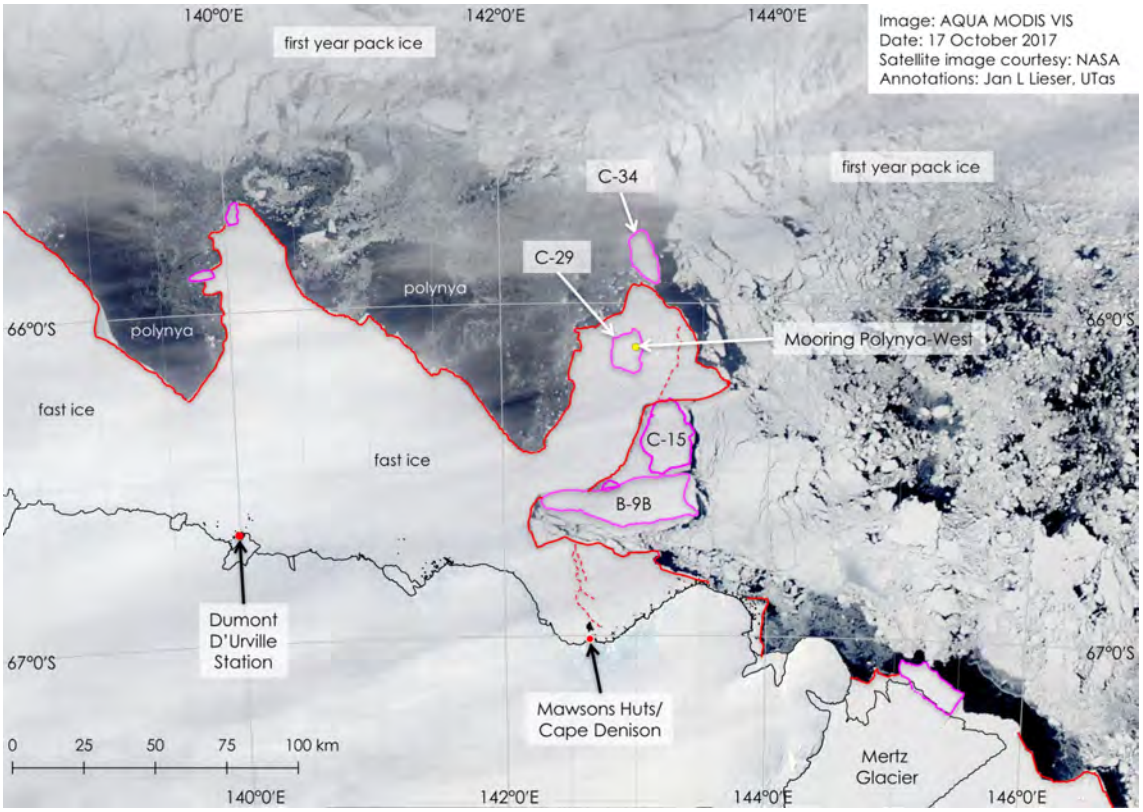

Figure 2: AQUA MODIS VIS scene acquired 17/10/2017 and provided by NASA.

During the past week, icebergs B-9B, C-15 and C-34 were moving slightly. Icebergs B-9B and C-15 are on an eastward track, while Iceberg C-34 has rotated approximately 40 degrees anti-clockwise.

Sea Ice Report #43.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

19/10/2017

Mawson Station

Figure 1 shows a very high-resolution (interferometric wide swath mode) SAR scene of Mawson Coast. The fast-ice edge is marked by a solid red line.

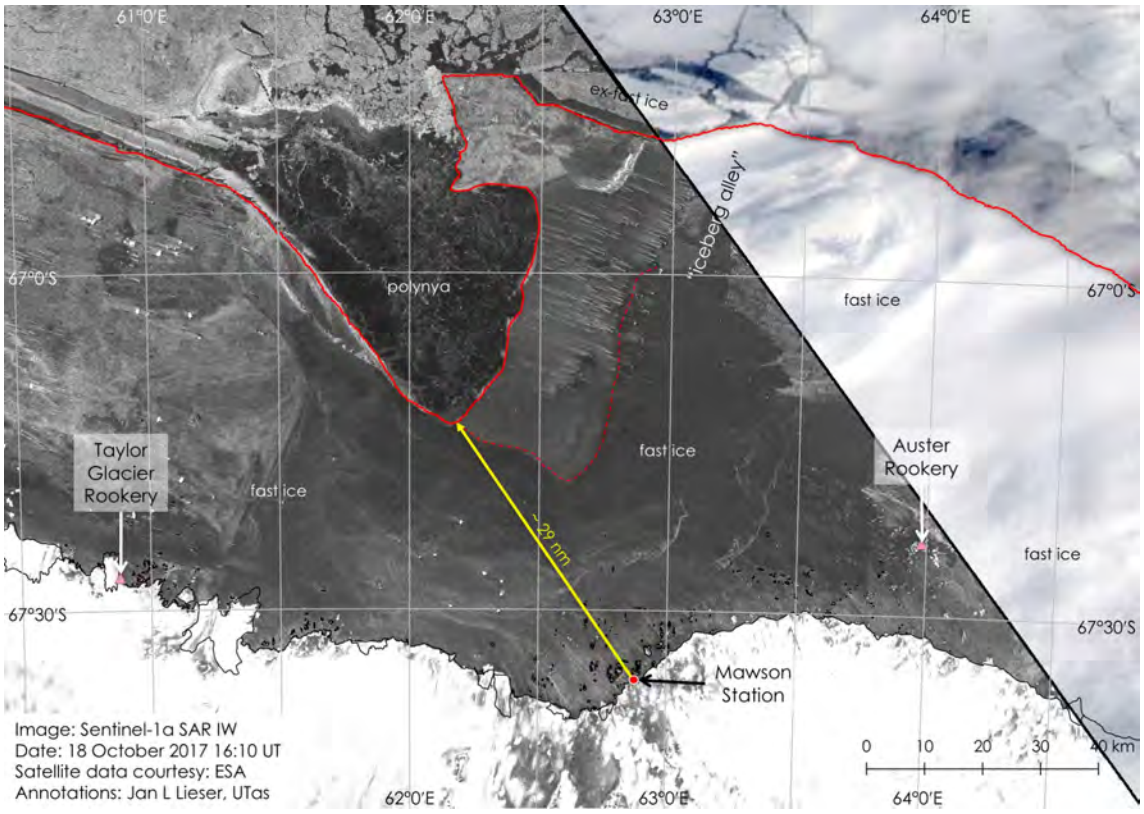

Figure 1: Sentinel-1a SAR IW acquired 18/10/2017 at 16:10 UT and provided by PolarView; complemented by AQUA MODIS VIS acquired 18/10/2017 and provided by NASA.

The distance to the polynya northwest of Mawson Station is 29 nautical miles. While the fast-ice edge at the polynya appears stable, the SAR shows some heterogeneity of the coastal fast ice. A prominent surface contrast is marked by a dashed, red line, along which breaking up of the fast ice can be expected.

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Casey Station

Figure 2 shows a very high-resolution (interferometric wide swath mode) SAR scene of Casey Station and vicinity. The fast-ice edge is marked by a solid red line.

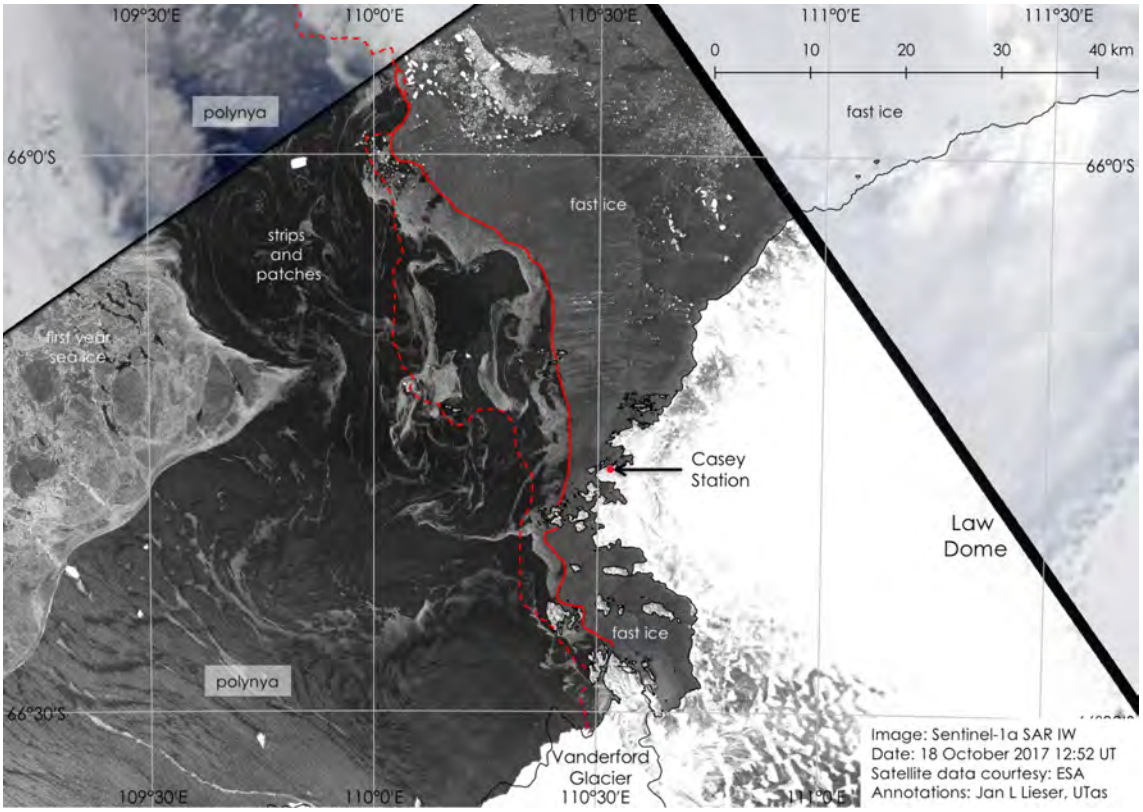

Figure 2: Sentinel-1a SAR IW acquired 18/10/2017 at 12:52 UT and provided by PolarView; complemented by AQUA MODIS VIS acquired 18/10/2017 and provided by NASA.

During the 48 hours prior to acquisition of the data, approximately 400 km^2 of fast ice broke off. The former fast-ice edge is shown as a dashed, red line. West of Casey Station, the fast-ice edge is now roughly 4.5 km closer to shore.

Sabrina Coast

Figure 3 shows a high-resolution (extra wide swath mode) SAR scene of Sabrina Coast and offshore.

Off the Totten Ice Shelf, the bay between Law Dome and the Dalton Iceberg Tongue is filled with first-year sea ice (except for the polynya west of the iceberg tongue, which is open water).

Iceberg B-9I continues its westward drift and is currently in approximately 500 m water depth.

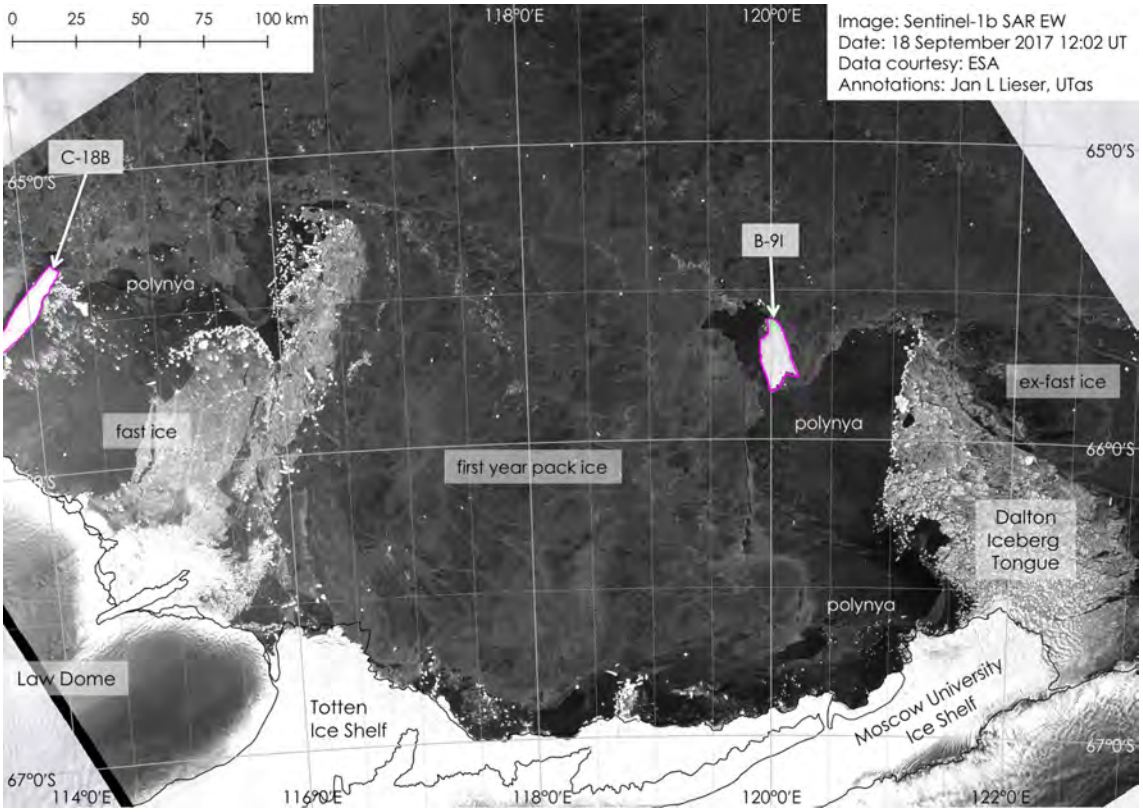

Figure 3: Sentinel-1b SAR EW acquired 18/10/2017 at 12:02 UT and provided by PolarView; complemented by AQUA MODIS VIS acquired 18/10/2017 and provided by NASA.

Sea Ice Report #43.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

20/10/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart of East Antarctica. The long-term median sea-ice extent for October is given by the dashed, yellow line. The locations of large, tabular icebergs are marked by pink dots.

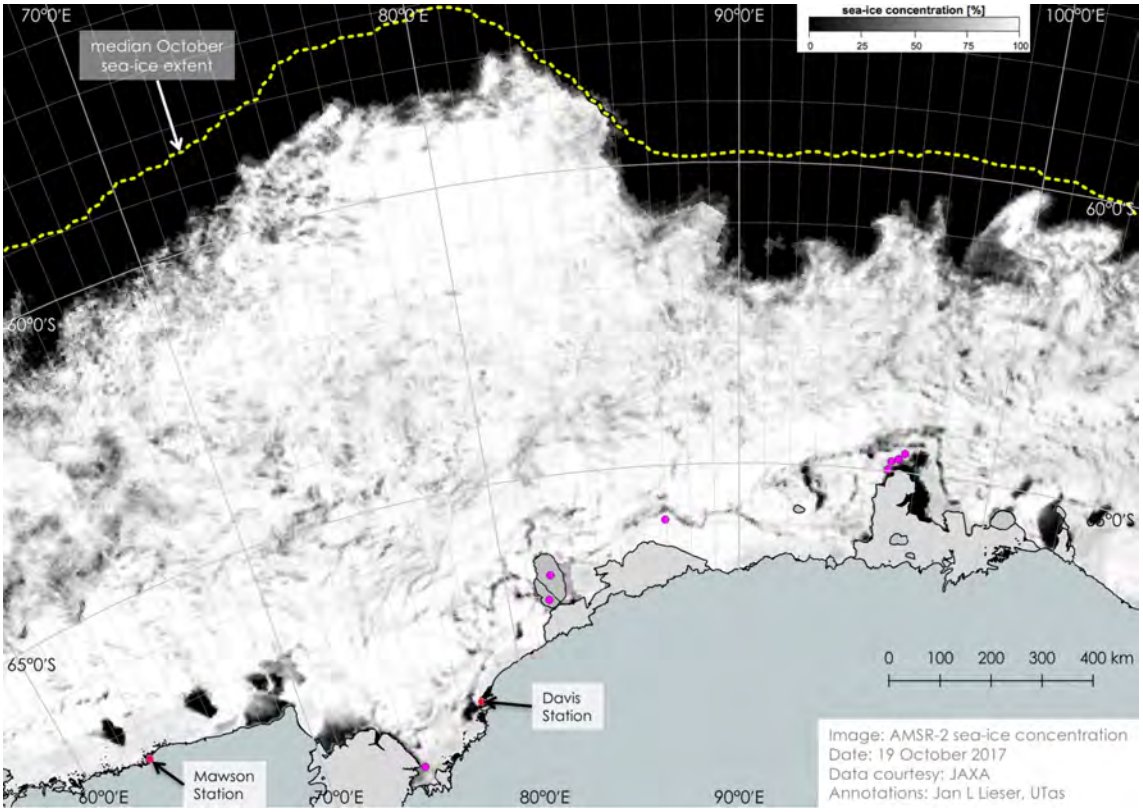

Figure 1: Sea-ice concentration data acquired 19/10/2017 and provided by ICDC, Universität Hamburg.

In the region, sea ice remains below median extent, but some areas of high concentration continue to exist.

Figure 2 shows the same geographical frame as Figure 1, but a composite of high-resolution SAR scenes. The sea-ice edge, as derived from the AMSR-2 data shown in Figure 1, is marked by a solid black line.

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The SAR scenes reveal a more distinct picture of the sea ice, and clearly show an cluster of large, old sea-ice floes in the middle of the pack ice roughly north of 65° S and west of 80° E. These floes appear as dark patches in the SAR.

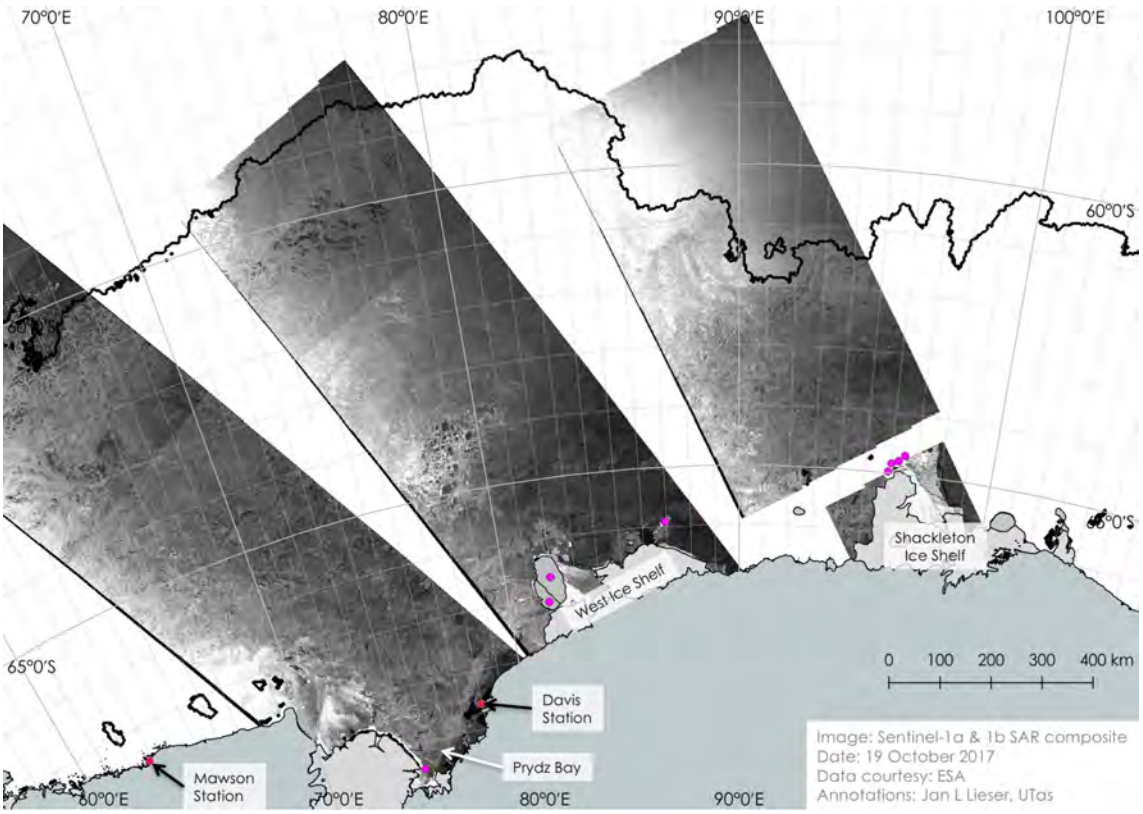

Figure 2: Sentinel-1a & 1b SAR composite acquired 19/10/2017 and provided by PolarView. The strip originating at the Shackleton Ice Shelf was acquired from 13:34 UT to 13:36 UT by Sentinel-1a and the strip originating at the West Ice Shelf was acquired from 14:22 UT to 14:24 UT by Sentinel-1b. The strip originating in Prydz Bay was acquired from 15:12 UT to 15:15 UT by Sentinel-1a.

Sea Ice Report #44.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

24/10/2017

Davis Station

Figure 1 shows a composite of high-resolution visible channels of Davis Station and vicinity.

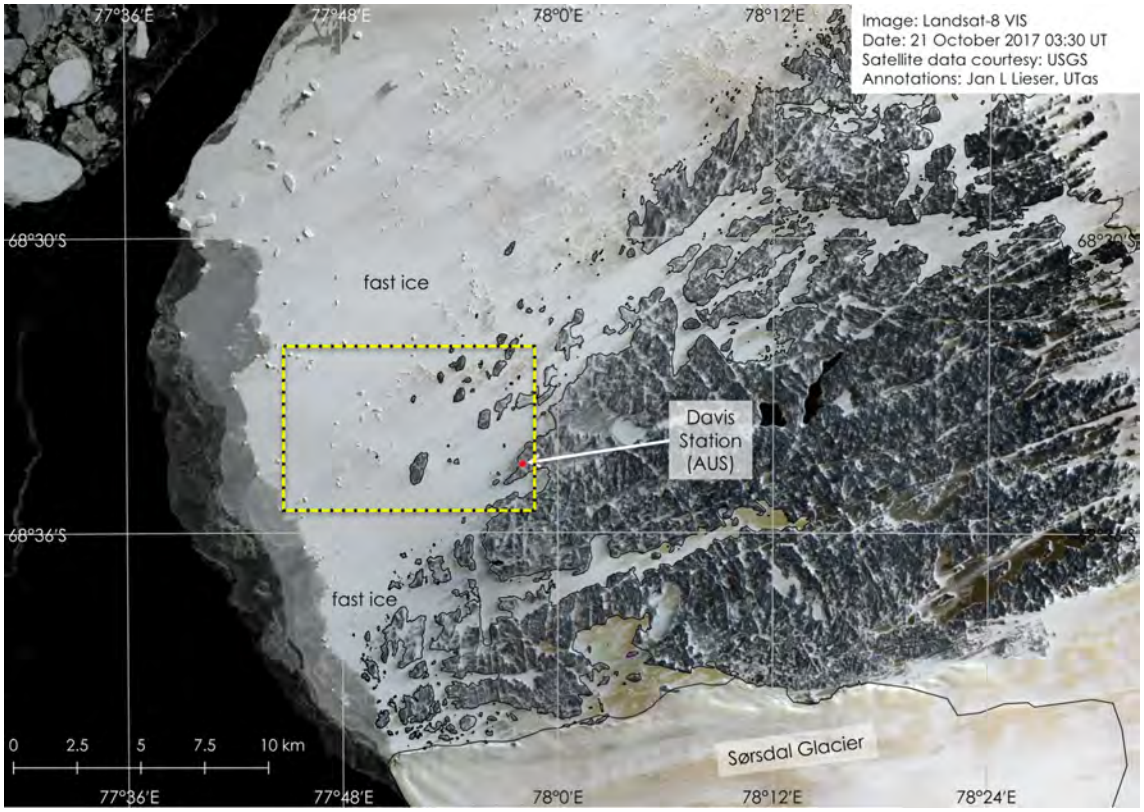

Figure 1: Landsat-8 visible composite acquired 21/10/2017 at 03:30 UT and provided by USGS.

Off the Vestfold Hills, fast ice is pinned between icebergs. Off the fast-ice edge, a margin of thin sea ice is attached. Further offshore, nilas has been pushed westward. During the past two weeks, the fast-ice edge has been stable and remains roughly 10 km west of the station (see Sea Ice Report #41.3/2017).

Figure 2 shows a detail of Figure 1 (black-yellow frame), but the panchromatic band.

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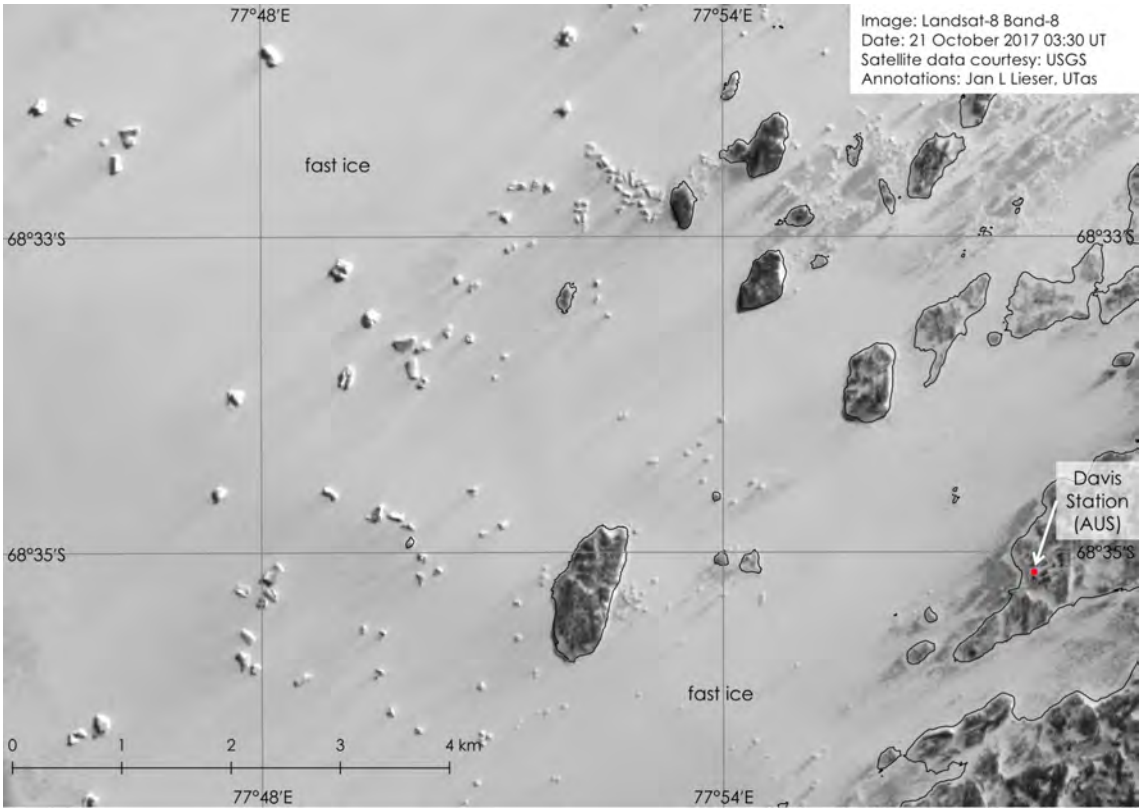

Figure 2: Landsat-8 Band-8 (panchromatic) scene acquired 21/10/2017 at 03:30 UT and provided by USGS.

Wind scouring can be seen immediately offshore Davis Station. Between the islands and icebergs, snow dunes stretch towards the southwest behind obstacles (icebergs), which indicates that there is an extensive snow cover present.

Sea Ice Report #44.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

25/10/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart of East Antarctica with an overlay of sea-ice drift vectors, derived from coarse-resolution microwave data for the time period of 21/10/2017 12:00 UTC to 23/10/2017 12:00 UTC (24 hours).

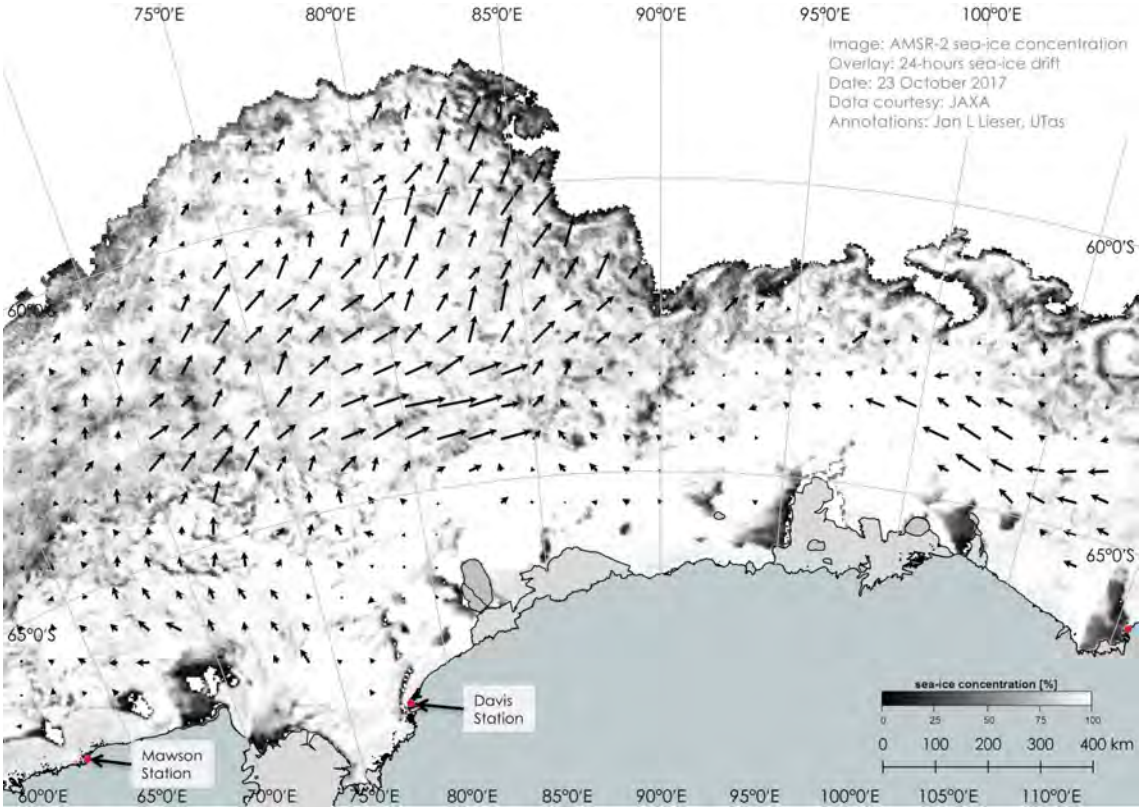

Figure 1: Sea-ice concentration and drift acquired 23/10/2017 and provided by Universität Hamburg and OSI-SAF.

East of 90° E and north of 65° S, the general drift direction has been towards the east and north and therefore outwards, which is consistent with reducing sea-ice concentration in the region. Further south, sea-ice concentration remains higher and drift speeds are much slower compared to the central pack ice and the sea-ice margin.

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Figure 2 shows the same geographical frame as Figure 1, but visible data.

While most of the scene is covered by clouds, some large sea-ice floes can be identified around 65° S. At the same time, larger openings show when sea ice is drifting northward, particularly west of 75° E, where lack of clouds enables a view of the ocean surface.

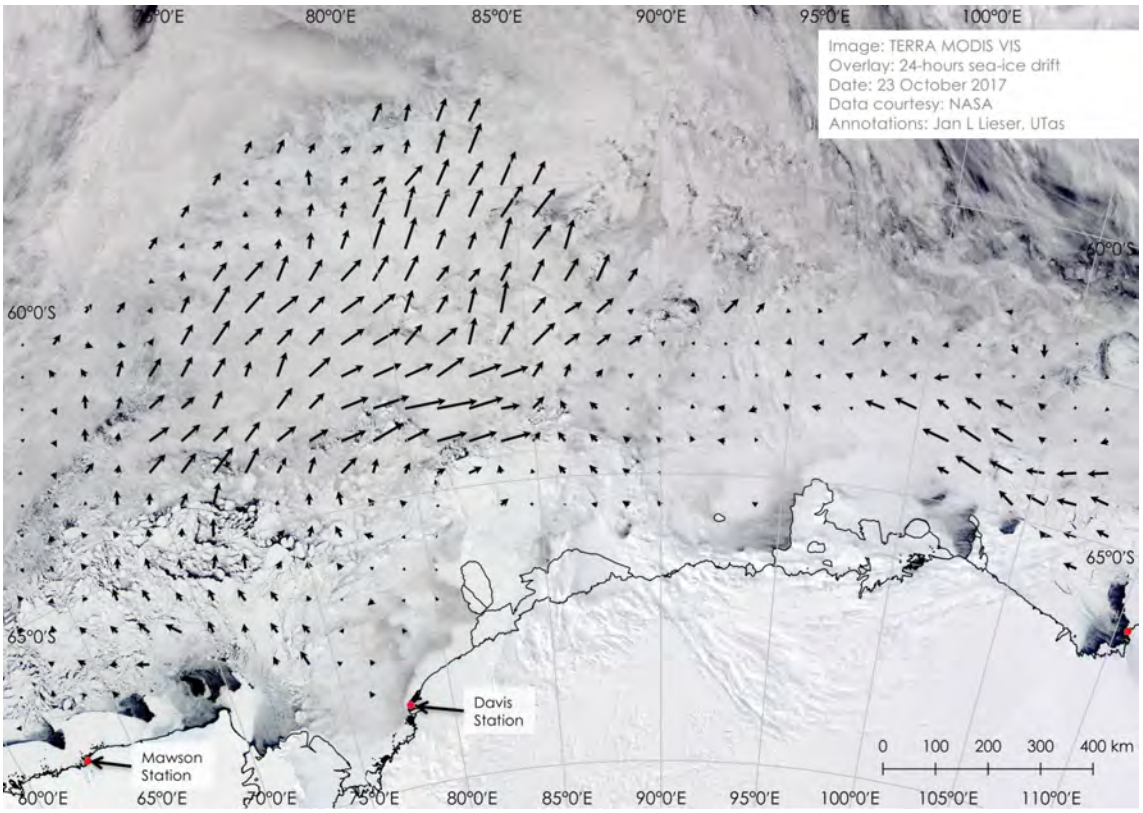

Figure 2: TERRA MODIS VIS data acquired 23/10/2017 and provided by NASA, sea-ice drift data as in Figure 1.

Sea Ice Report #44.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

27/10/2017

Cooperation Sea

Figure 1 shows a sea-ice concentration chart of Cooperation Sea with an overlay of sea-ice drift vectors, derived from coarse-resolution microwave data for the time period of 23/10/2017 12:00 UTC to 25/10/2017 12:00 UTC (24 hours). The yellow line denotes the long-term median sea-ice extent for October.

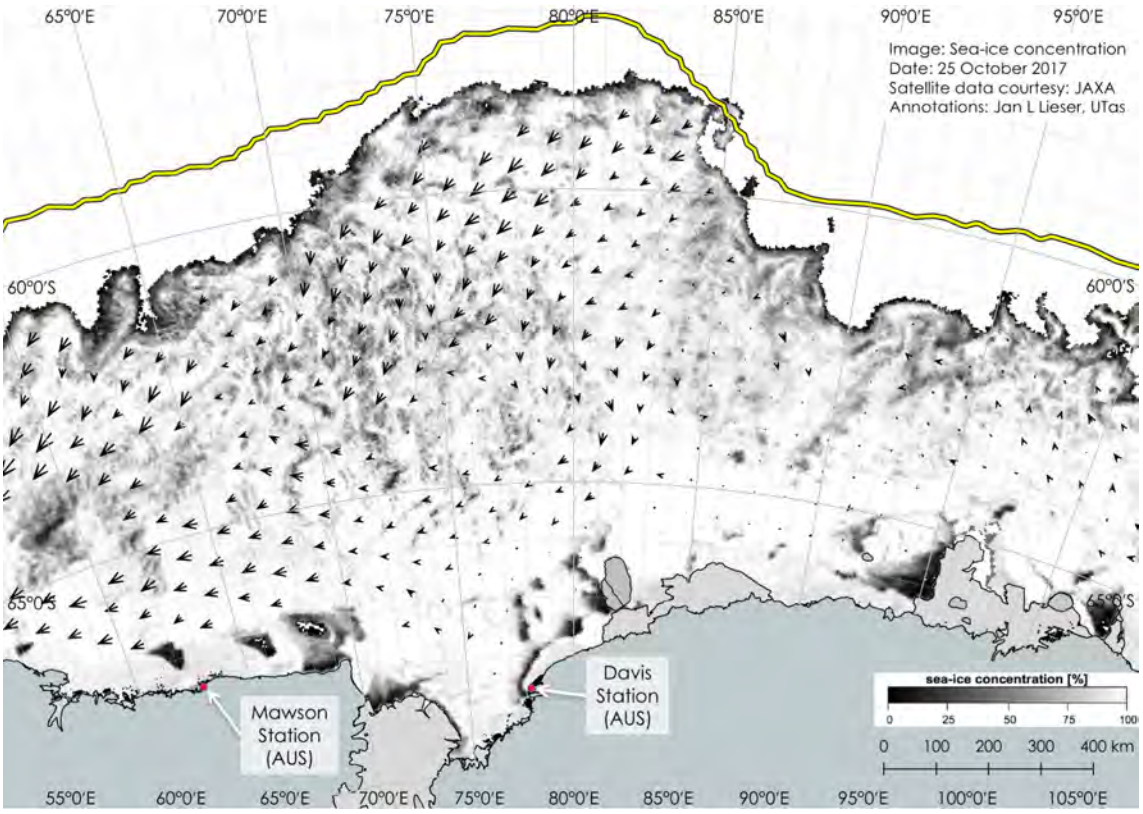

Figure 1: Sea-ice concentration and drift acquired 25/10/2017 and provided by Universität Hamburg and OSI-SAF.

Sea-ice extent is below (south of) the median and within this extent sea-ice concentration is medium high to high, with patches of low concentration as well. Sea-ice drift speeds are generally low in the region and drift direction tends towards southwesterly and westerly directions. Coastal areas of very low sea-ice concentration (including open water) clearly show in the high-resolution sea-ice concentration chart.

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D'Urville Sea

Figure 2 shows visible data of D'Urville Sea.

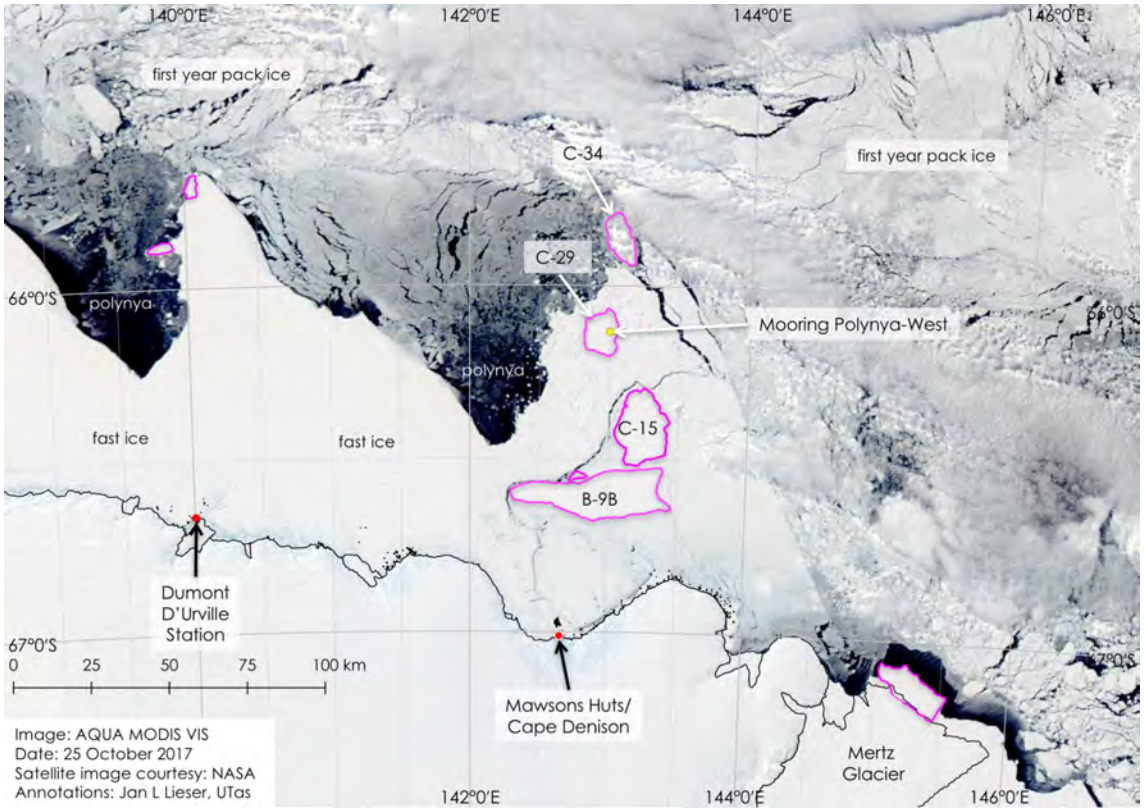

Figure 2: AQUA MODIS VIS data acquired 25/10/2017 and provided by NASA.

Between Dumont D'Urville Station and Mertz Glacier, the general ice-scape has changed only a little during the past 10 days. However, the fast ice is retreating slightly at its northern edge. Off Cape Denison, fast ice appears to be breaking up as well, and east of the cape, the ice is not attached to land anymore with another major crack visible running north off Mawsons Huts.

Sea Ice Report #45.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

30/10/2017

Cooperation Sea

Figure 1 shows a sea-ice concentration chart of Cooperation Sea with an overlay of sea-ice drift vectors, derived from coarse-resolution microwave data for the time period of 26/10/2017 12:00 UTC to 28/10/2017 12:00 UTC (24 hours). The yellow (orange) line denotes the long-term median sea-ice extent for October (November). Locations of large tabular icebergs are marked by pink dots.

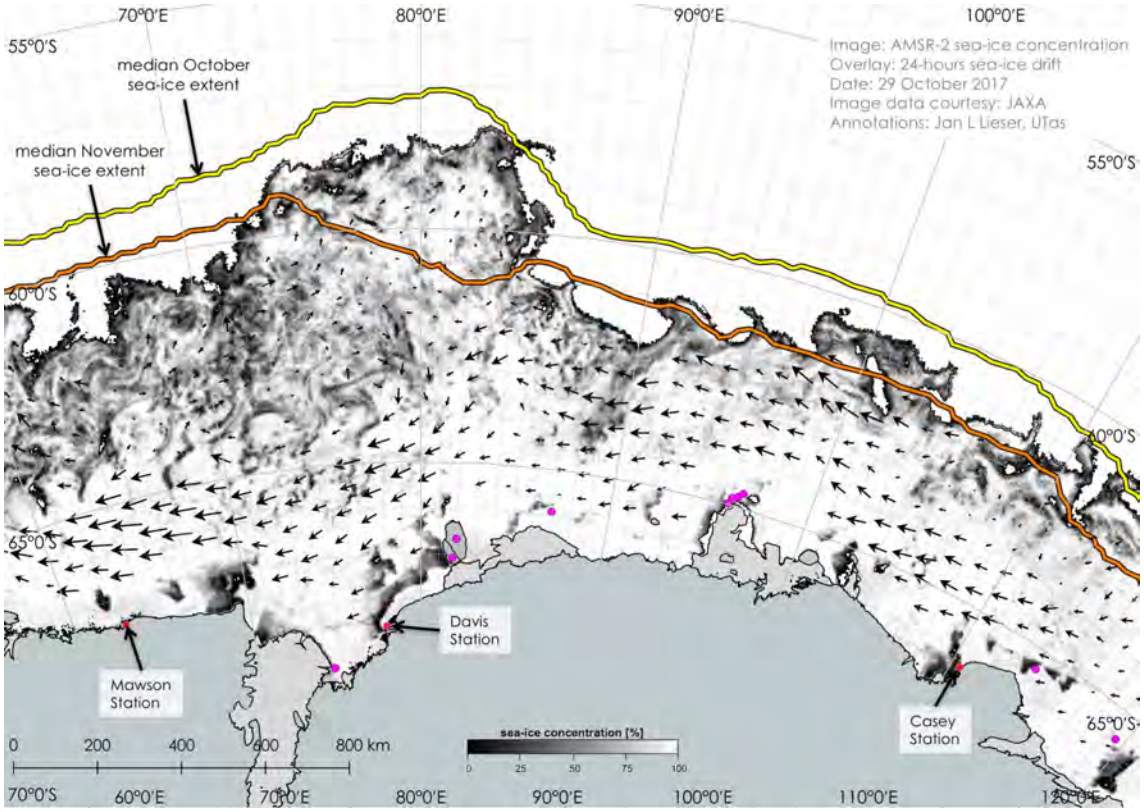

Figure 1: Sea-ice concentration and drift acquired 29/10/2017 and provided by Universität Hamburg and OSI-SAF.

Sea-ice has almost reached median November extent already, except for a region between 73° E and 85° E. Sea-ice drift speeds are generally low in the marginal ice zone and slightly larger in a band roughly along the continental shelf break and 150 nautical miles north of it, where drift direction tends towards westerly and southwesterly directions.

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Davis Station

Figure 2 shows a high-resolution visible scene of Davis Station and vicinity. Some shadows of thin clouds can be seen on the surface.

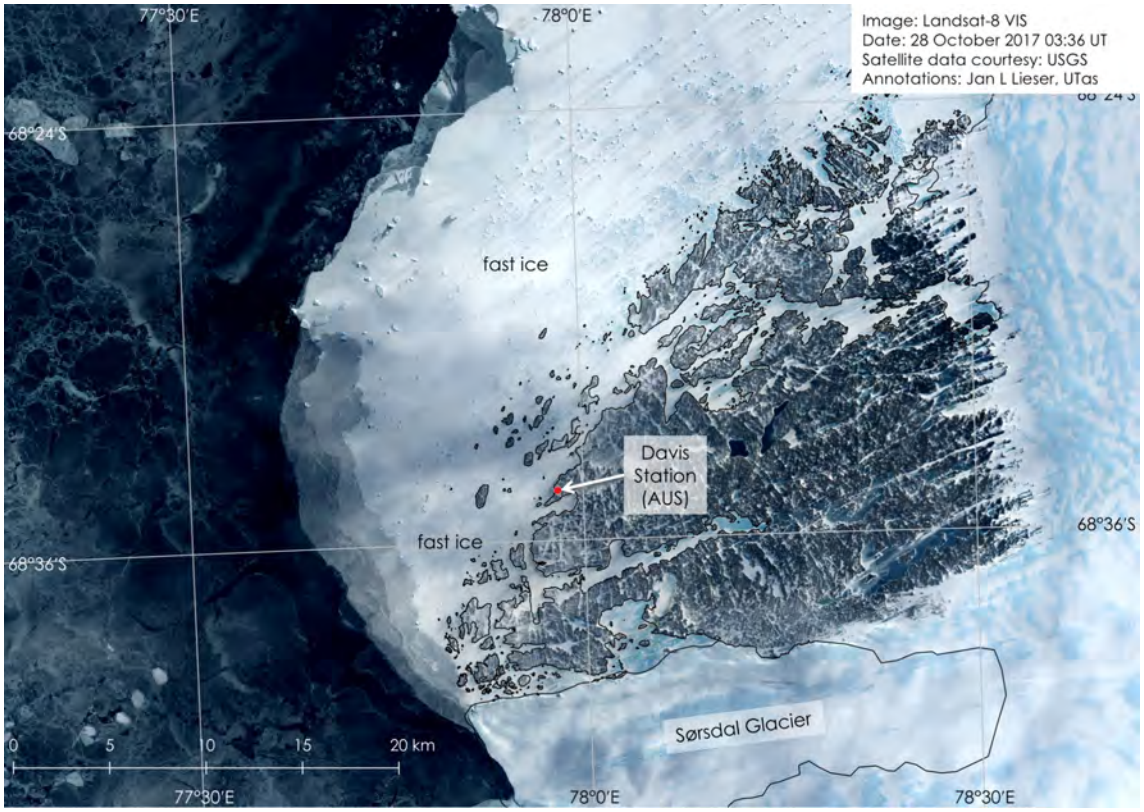

Figure 2: Landsat-8 VIS data acquired 28/10/2017 at 03:36 UT and provided by USGS.

The fast-ice edge has moved slightly westward, where thin, new sea ice attached offshore.

D'Urville Sea

Figure 3 shows a high-resolution SAR scene of D'Urville Sea.

The positions of four large, tabular icebergs are clearly visible. A coastal crack is also seen east of Cape Denison. On the northern edge of Mertz Ice Shelf, the circumference of the loose tooth (pink outline) is roughly 64 km, of which only 4 km are still attached to the shelf.

Halley VI Station

Figure 4 shows a high-resolution SAR scene of the southern Brunt Ice Shelf.

Two large cracks are currently being monitored northeast and east of the British Halley VI Station. The current end points are indicated by yellow dots.

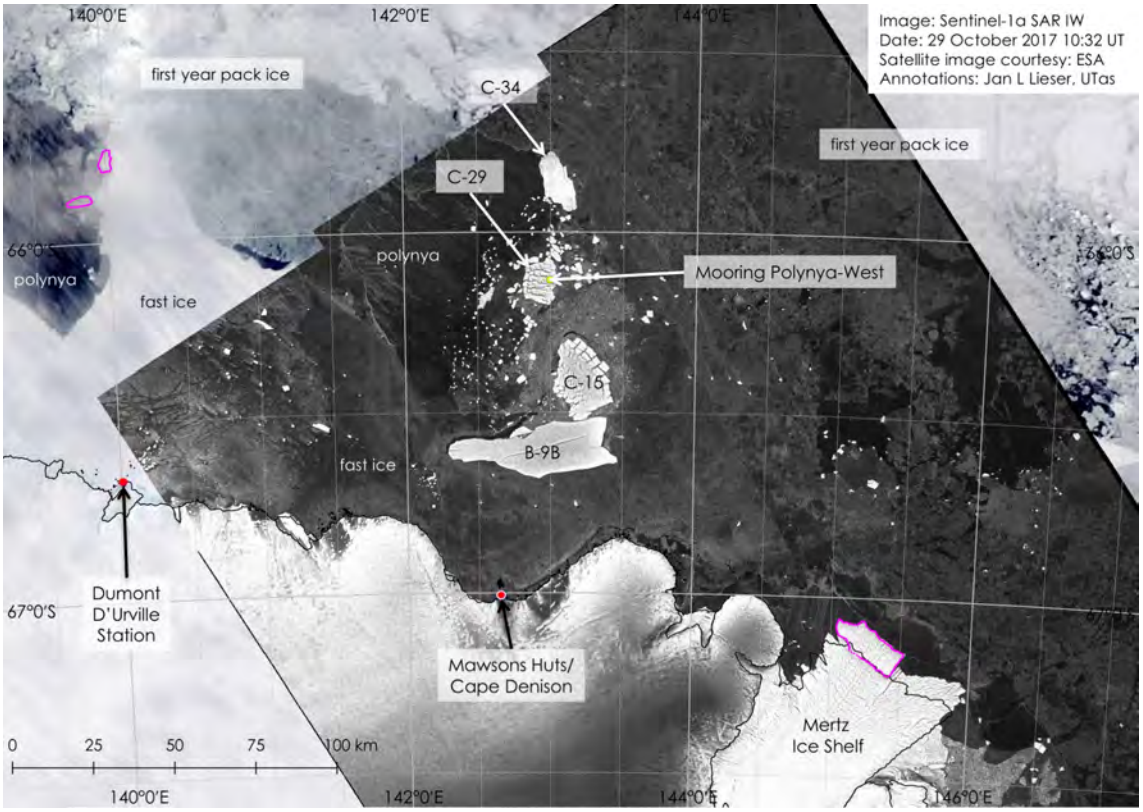

Figure 3: Sentinel-1a SAR IW scene acquired 29/10/2017 at 10:32 UT and provided by PolarView complemented by AQUA MODIS VIS data acquired 29/10/2017 and provided by NASA.

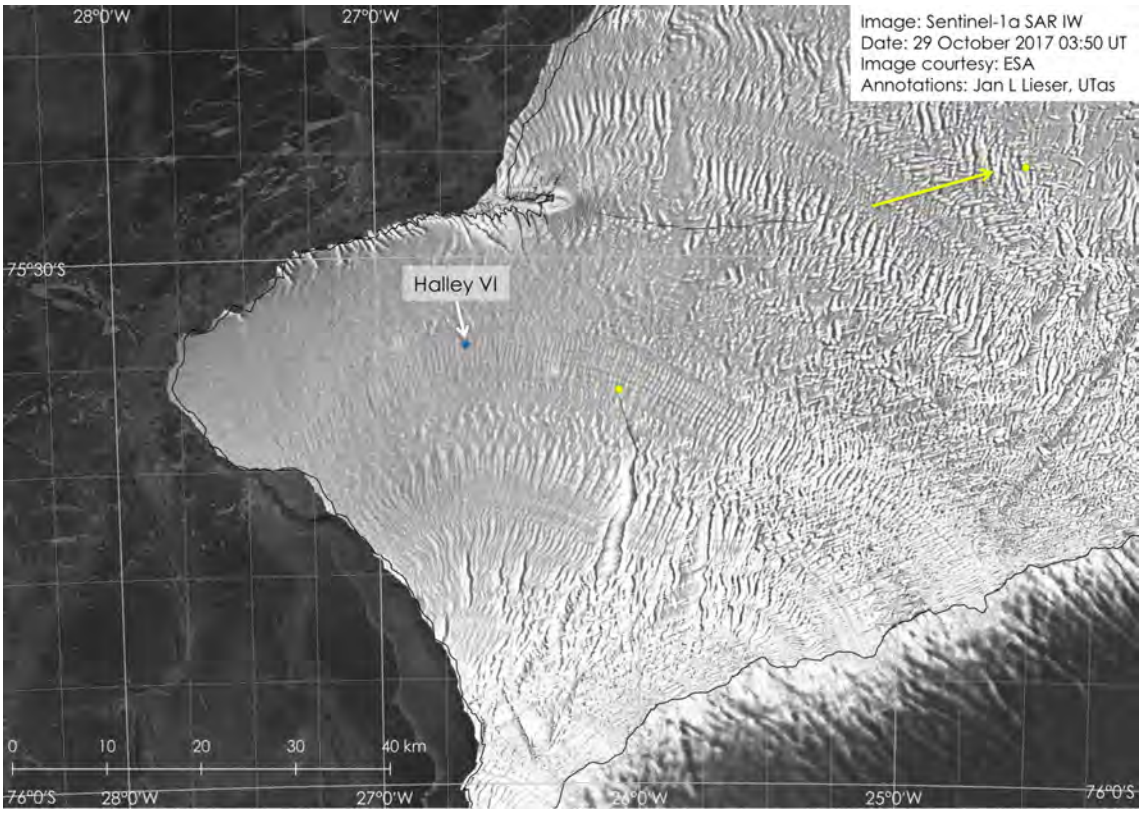

Figure 4: Sentinel-1a SAR IW scene acquired 29/10/2017 at 03:50 UT and provided by PolarView.

Sea Ice Report #45.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

02/11/2017

Cooperation Sea

Figure 1 shows a sea-ice concentration chart of Cooperation Sea with an overlay of sea-ice drift vectors, derived from coarse-resolution microwave data for the time period of 29/10/2017 12:00 UTC to 31/10/2017 12:00 UTC (24 hours).

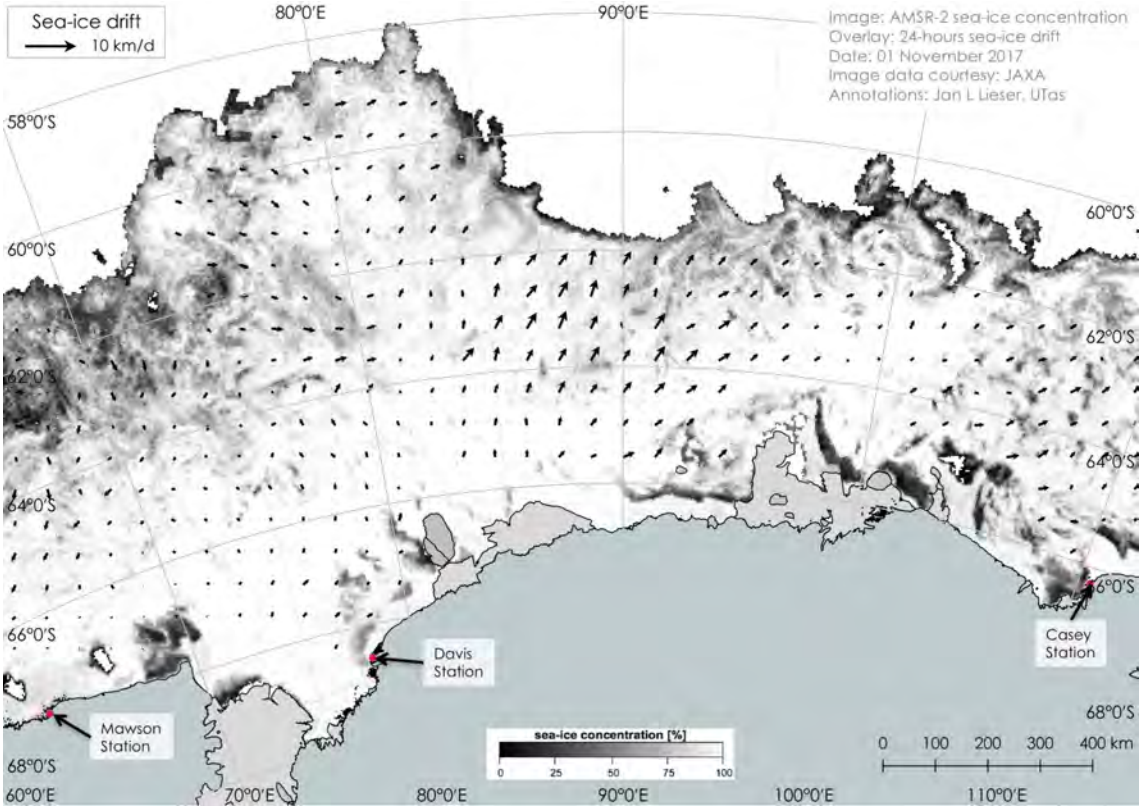

Figure 1: Sea-ice concentration and drift acquired 01/11/2017 and provided by Universität Hamburg and OSI-SAF.

Sea-ice drift speeds are generally low in the region but are in line with the predominant low wind speeds during the observation period.

Davis Station

Figure 2 shows a high-resolution SAR scene of Davis Station and vicinity.

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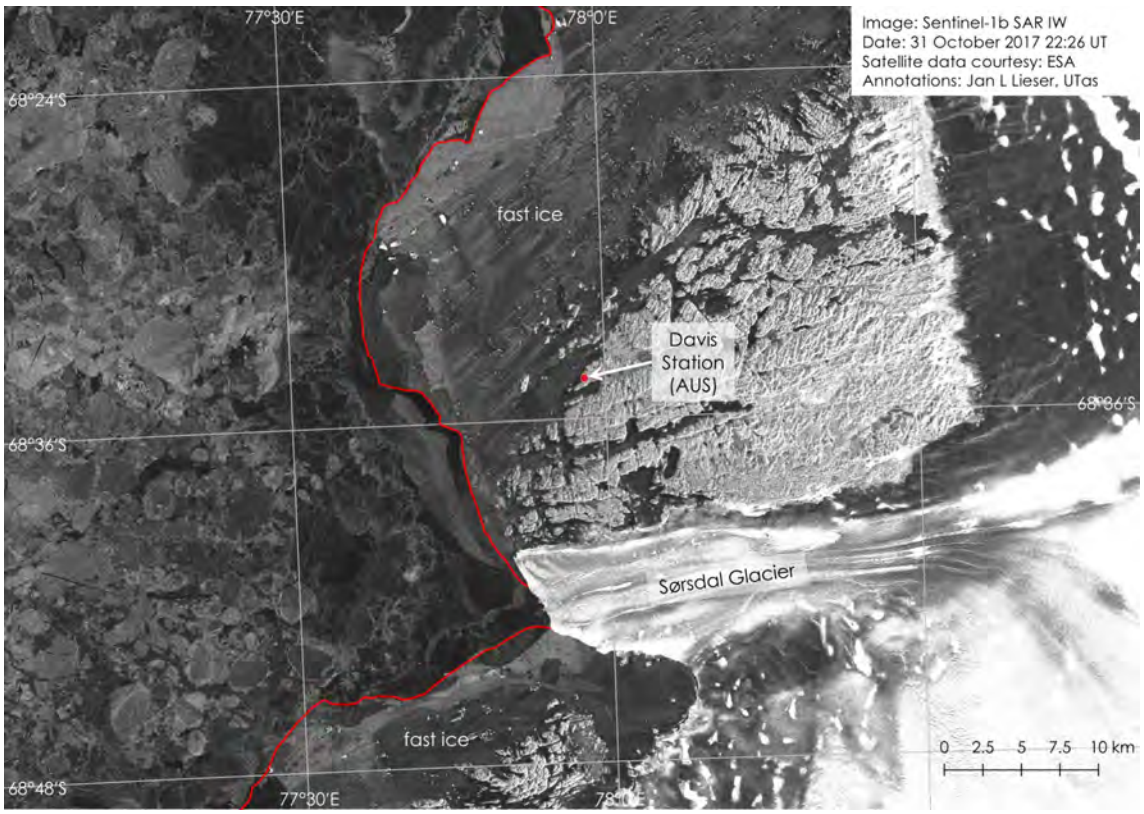

Figure 2: Sentinel-1b SAR IW scene acquired 31/10/2017 at 22:26 UT and provided by PolarView.

Some of the recently accreted fast-ice has broken off again from the southern part of the Vestfold Hills (north of Sørsdal Gacier).

Sea Ice Report #46.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

06/11/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart of Cooperation Sea with an overlay of SAR swath composites. The October and November median sea-ice extent is indicated by the yellow/black and orange/black lines, respectively. The cruise track of RSV *Aurora Australis* (up until 06/11/2017 02:30 UT) is shown as a thin red line.

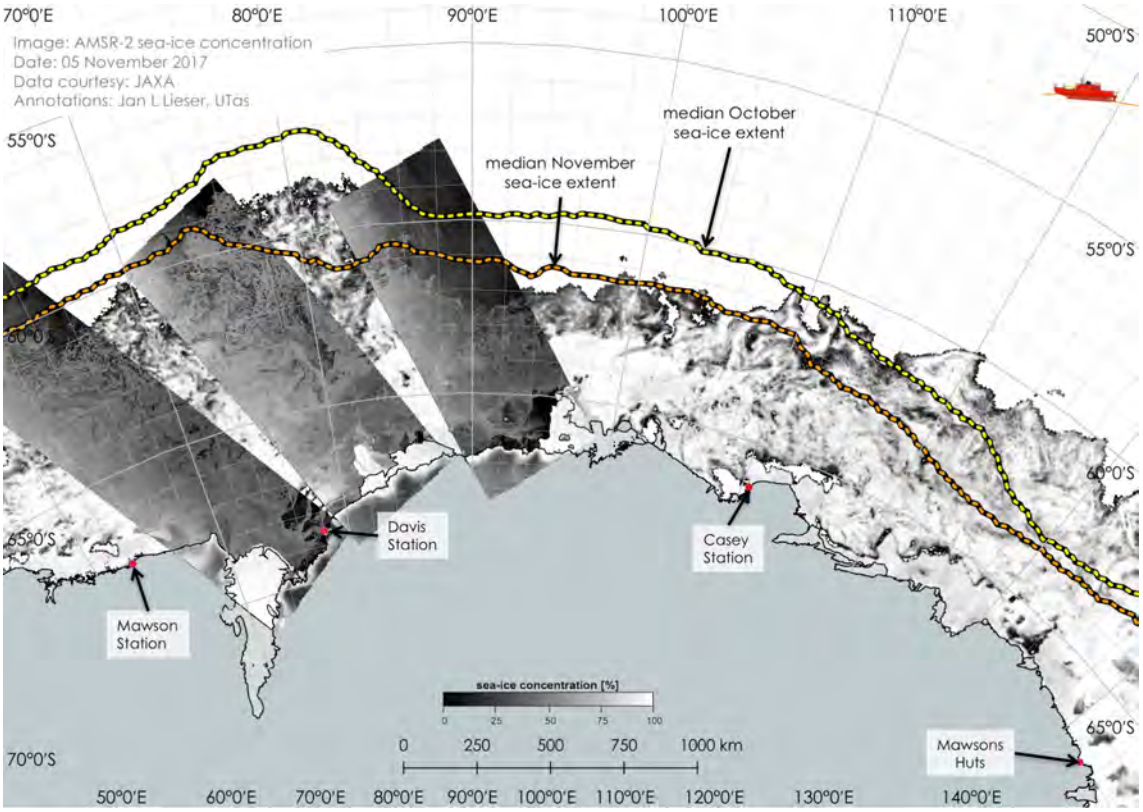

Figure 1: Sea-ice concentration acquired 05/11/2017 and provided by Universität Hamburg. Overlay of Sentinel-1 SAR swaths acquired 05/11/2017 at 13:42 UT (eastern), 14:30 UT (middle) and 15:20 UT (western) and provided by Drift + Noise Polar Services.

In Cooperation Sea (north of Davis Station), sea-ice concentration appears patchy, but a band of high-concentration sea ice exists south of 63° 30' S. Offshore Ingrid Christensen Coast, a polynya stretches from roughly 75° E to the West Ice Shelf (81° 30' E).

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Davis Station

Figure 2 shows a high-resolution SAR scene of Davis Station and vicinity. The yellow, dashed, line shows the fast-ice edge on 31/10/2017. The red line shows the fast-ice edge as determined from data shown in the figure.

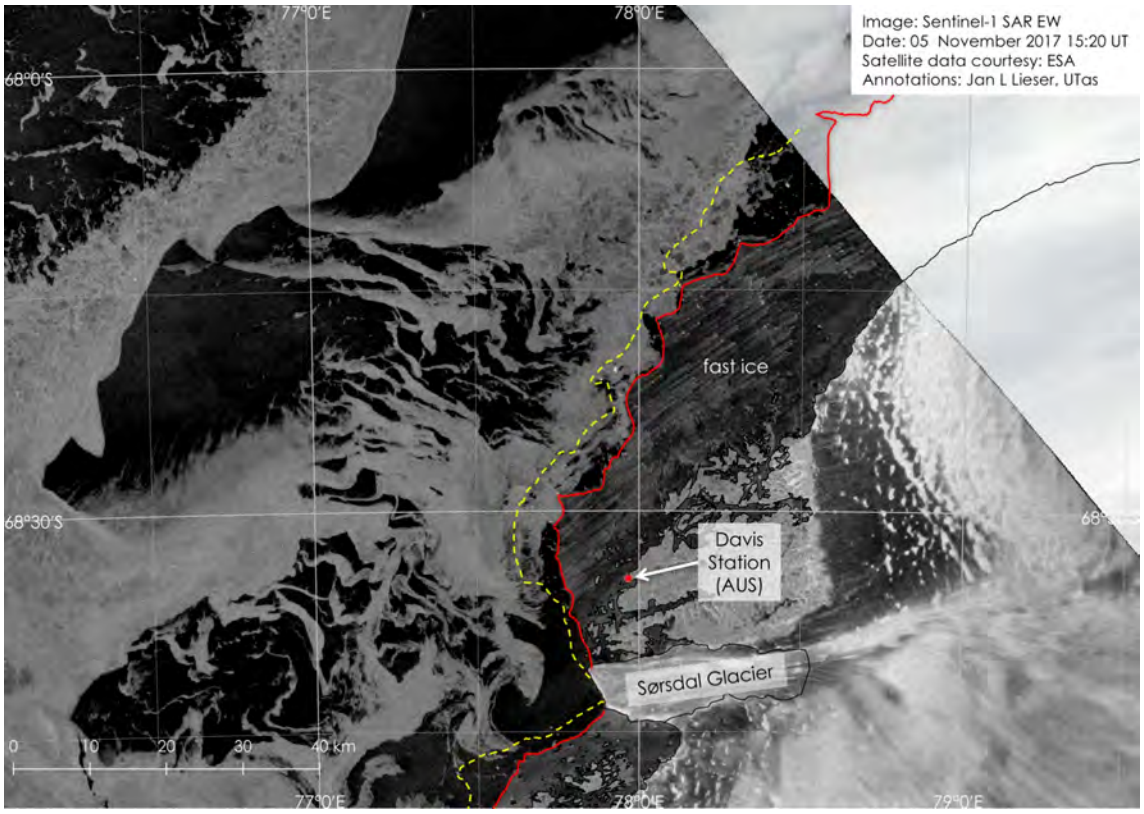

Figure 2: Sentinel-1 SAR EW scene acquired 05/11/2017 at 15:20 UT and provided by Drift + Noise Polar Services, complemented by AQUA MODIS VIS data, acquired 05/11/2017 and provided by NASA.

The fast-ice edge has receded eastward. The (above mentioned) polynya is seen covered by strips and patches of sea ice, which is being pushed westward.

Macquarie Island

Late last week, an iceberg was observed drifting offshore Macquarie Island. In the very high-resolution Sentinel-2a image shown in Figure 3, the iceberg can be seen roughly 6.5 km north of the northern tip of the island. The iceberg is estimated to be approximately 140 m by 110 m and of 'dry-dock' shape. Some fragments of the iceberg are floating southeast of the berg and smaller bits have been washed ashore at Macquarie Island Station.

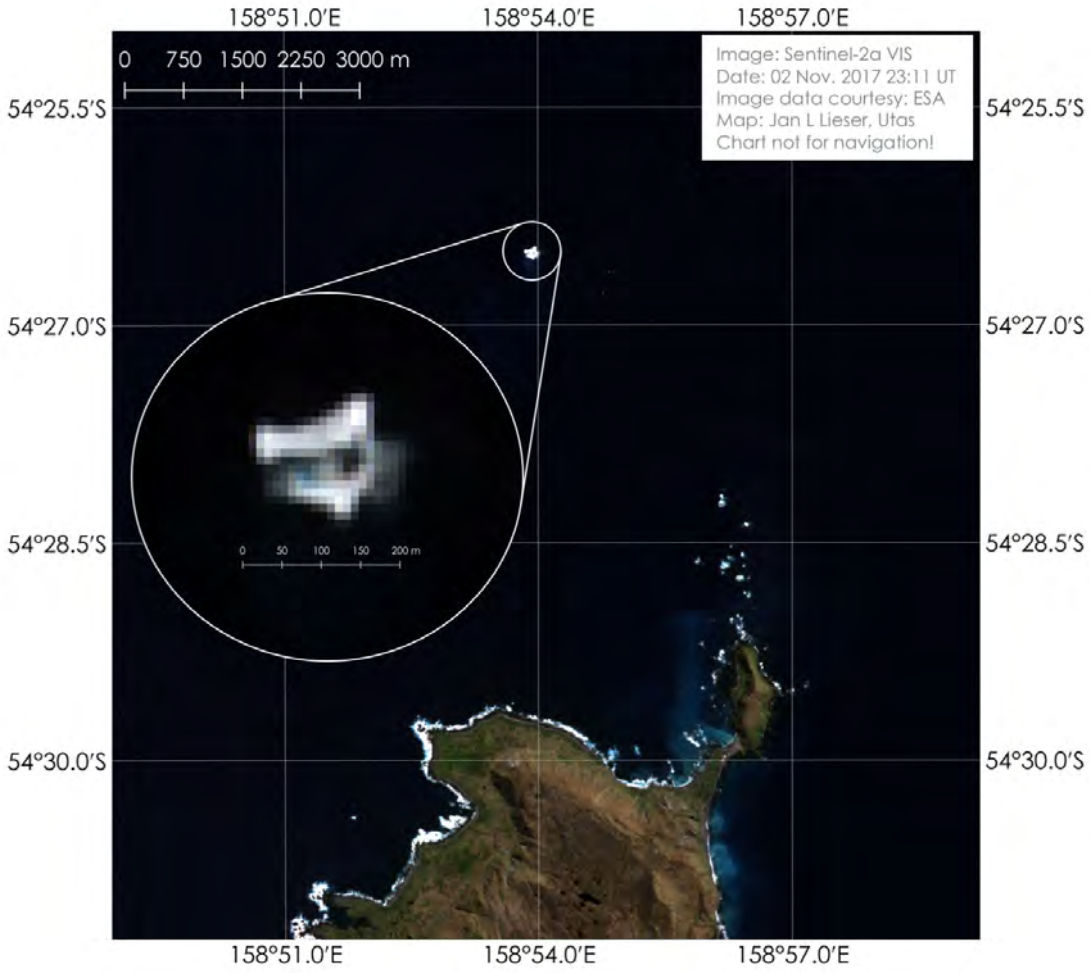

Figure 3: Sentinel-2a visible composite acquired 02/11/2017 at 23:11 UT and provided by ESA.

Sea Ice Report #46.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

08/11/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart of Cooperation Sea and east of it. The blue square marks the position of the SAR scene of Figure 2, which shows a high-resolution SAR scene of the sea ice northeast of Davis Station.

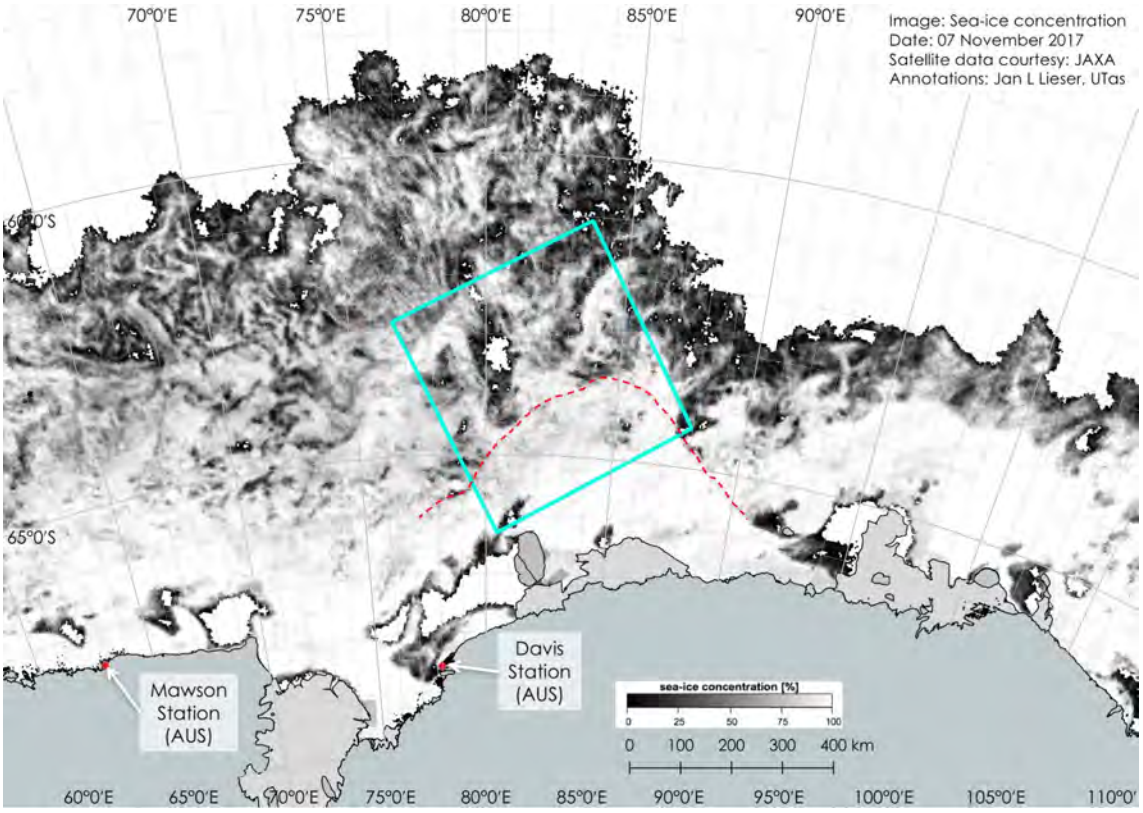

Figure 1: Sea-ice concentration acquired 07/11/2017 and provided by Universität Hamburg.

North of Davis Station, sea-ice concentration appears patchy, but the northern boundary of a band of high-concentration sea ice is marked by a dashed, red line. North of this line, low to medium-high sea-ice concentration is found and large-scale oceanic eddies appear to move the sea ice. South of this line, some very large sea-ice floes are embedded in the sea-ice matrix and can be identified in Figure 2.

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Offshore Ingrid Christensen Coast, a large polynya still exists from roughly 75° E to the West Ice Shelf (81° 30' E) and the large icebergs north of it.

The high-resolution SAR scene clearly shows the mostly loose sea-ice patches north of the orange line and some vast sea-ice floes south of it (note: in the western part of the SAR scene, open water appears bright/white, where low sea-ice concentration of the background chart is represented as dark/black).

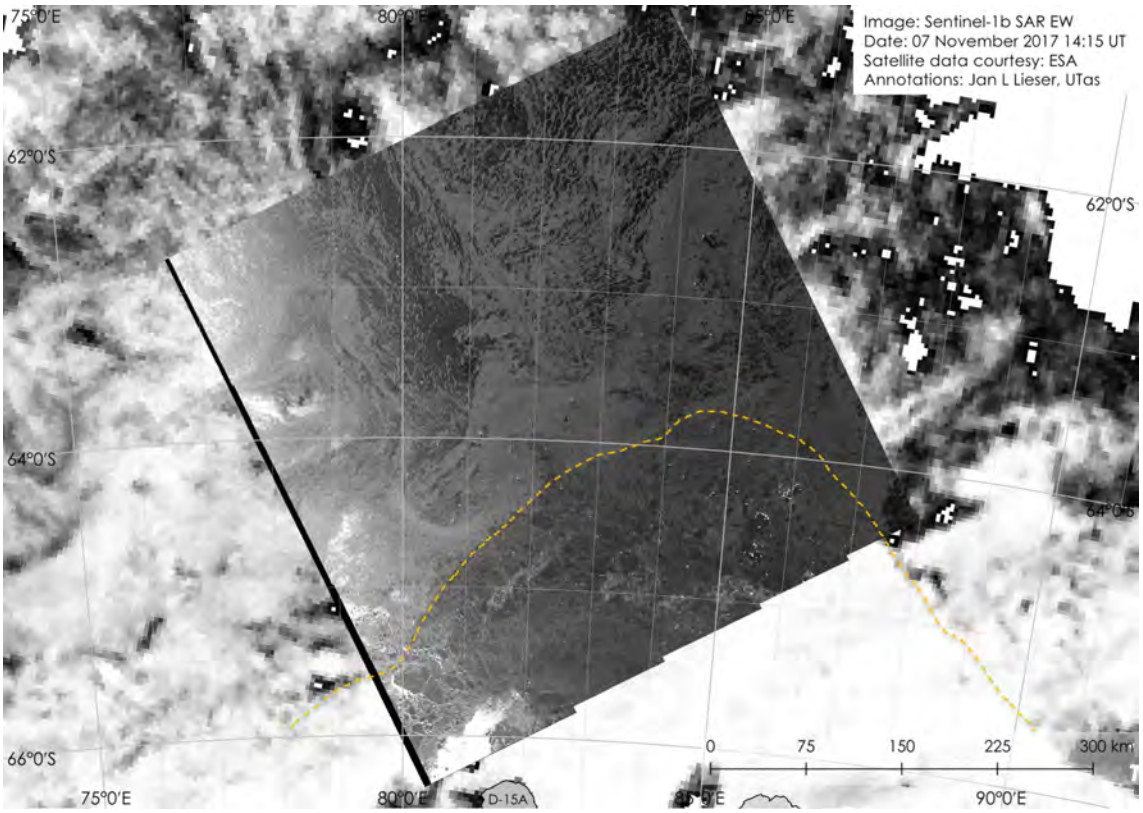

Figure 2: Sentinel-1b SAR EW scene acquired 07/11/2017 at 14:15 UT and provided by PolarView; Background: sea-ice concentration of Figure 1.

D'Urville Sea

Figure 3 shows a largely cloud-covered, visible scene offshore between Dumont D'Urville Station and the Mertz Ice Shelf. Four large, tabular icebergs are only roughly marked and the fast-ice edge is given by the dashed, red line, where it was positively identified on 06/08/2017 (west of 143° 30' E).

Northwest of iceberg B-9B, a fast-ice bridge (red shaded shape in Figure 3), which connected fast ice around iceberg C-29 and smaller bergs between iceberg C-29 and iceberg B-9B with the body of shore-fast sea ice north and east of Dumont D'Urville Station, appears to have collapsed and debris can be seen (through the thin clouds) floating in the southern part of the polynya (around 142° E).

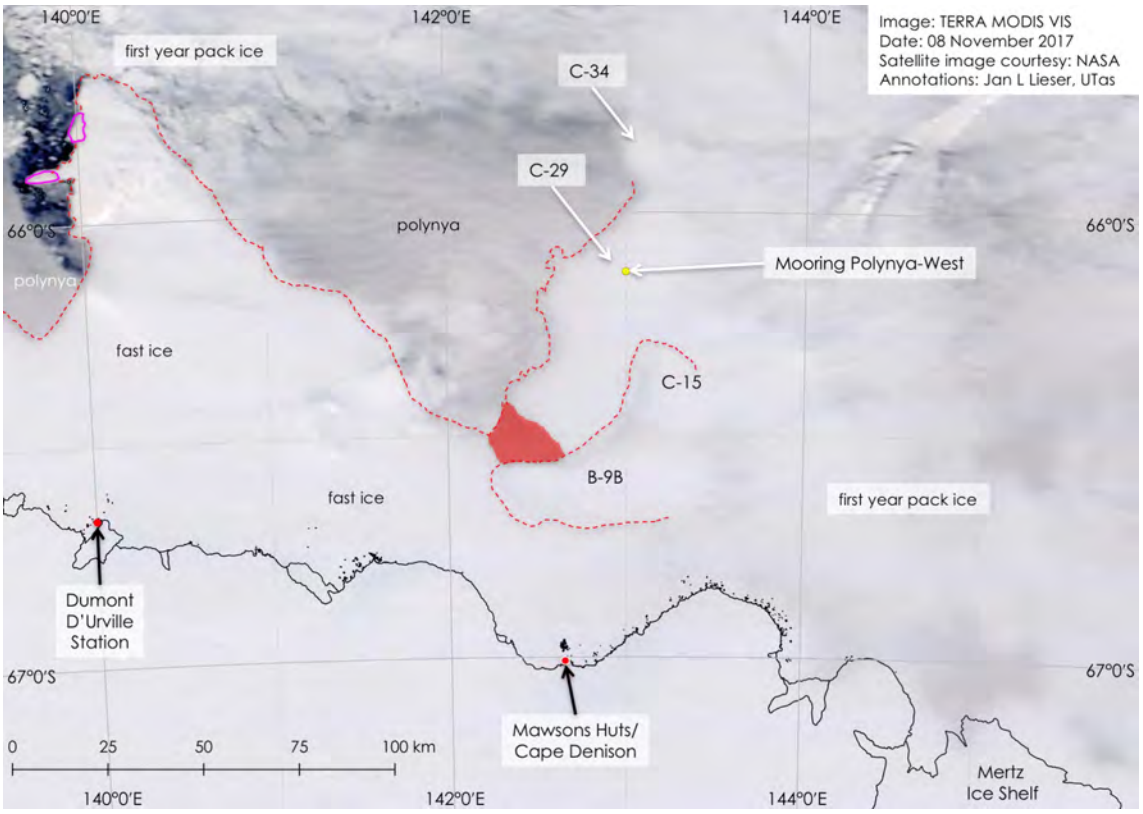

Figure 3: TERRA MODIS VIS scene acquired 08/11/2017 and provided by NASA.

Sea Ice Report #46.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

09/11/2017

East Antarctica

Figure 1 shows a SAR and sea-ice concentration composite for the region north of the Shackleton Ice Shelf.

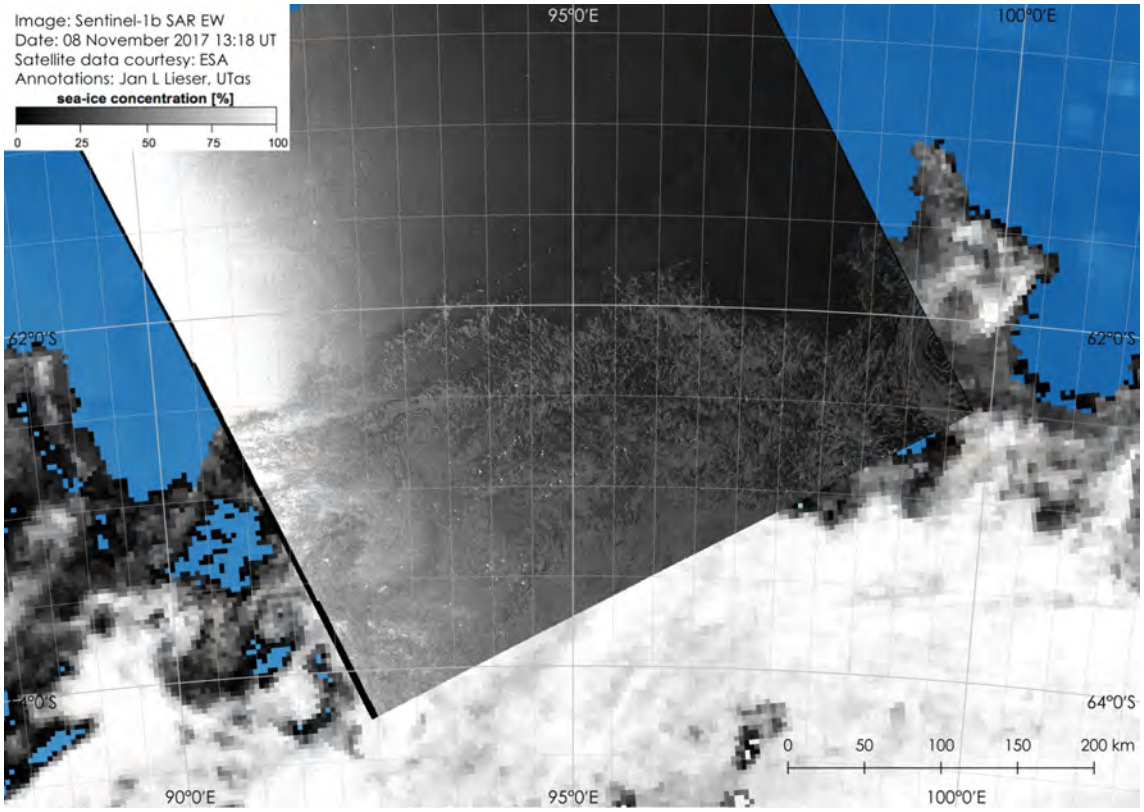

Figure 1: Sentinel-1b SAR EW scene acquired 08/11/2017 at 13:18 UT and provided by PolarView; Sea-ice concentration data acquired 08/11/2017 and provided by Universität Hamburg.

The high-resolution SAR scene clearly shows the loose sea-ice strips and patches of the marginal ice zone. Also the presence of icebergs can be detected throughout the entire SAR scene.

Davis Station

Figure 2 shows a high-resolution visible scene of Davis Station and vicinity.

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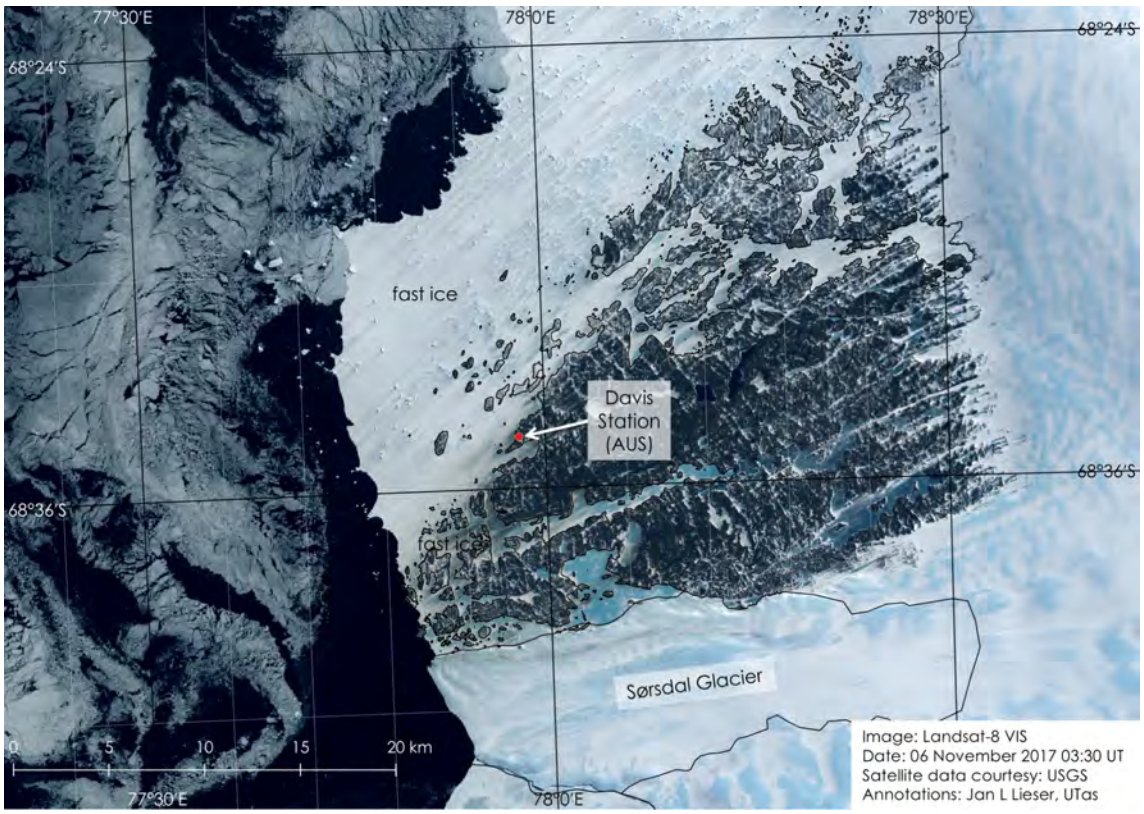

Figure 2: Landsat-8 VIS scene acquired 06/11/2017 at 03:30 UT and provided by USGS.

U-shaped marks at the fast-ice edge are a result of fast ice breaking out between its anchor points (here: icebergs). Broken sea ice can be seen off the fast-ice edge.

Casey Station

Figure 3 shows a very high-resolution (15 m) panchromatic scene of Casey Station and surroundings.

Immediately north of the station, fast ice is retreating towards the coast, but the overall shape of the body of fast ice northwest of Law Dome remains largely unchanged. Strips and patches of sea ice cover the polynya of Vincennes Bay southwest of the station.

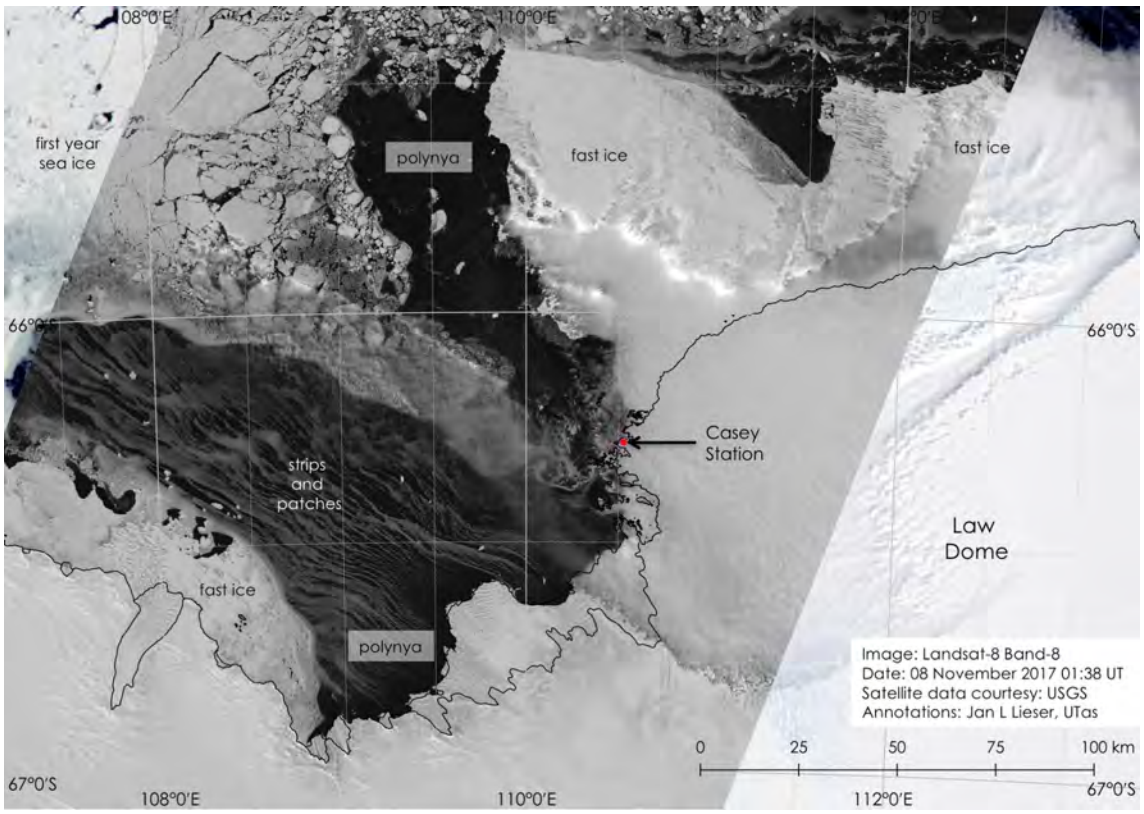

Figure 3: Landsat-8 Band-8 (panchromatic) scene acquired 08/11/2017 at 01:38 UT and provided by USGS complemented by AQUA MODIS VIS scene acquired 08/11/2017 and provided by NASA.

Sea Ice Report #46.4/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

09/11/2017

D'Urville Sea

Figure 1 shows an almost completely cloud-free scene of D'Urville Sea and the coast between Dumont D'Urville Station and the Mertz Ice Shelf. The fast-ice edge is marked by a solid red line.

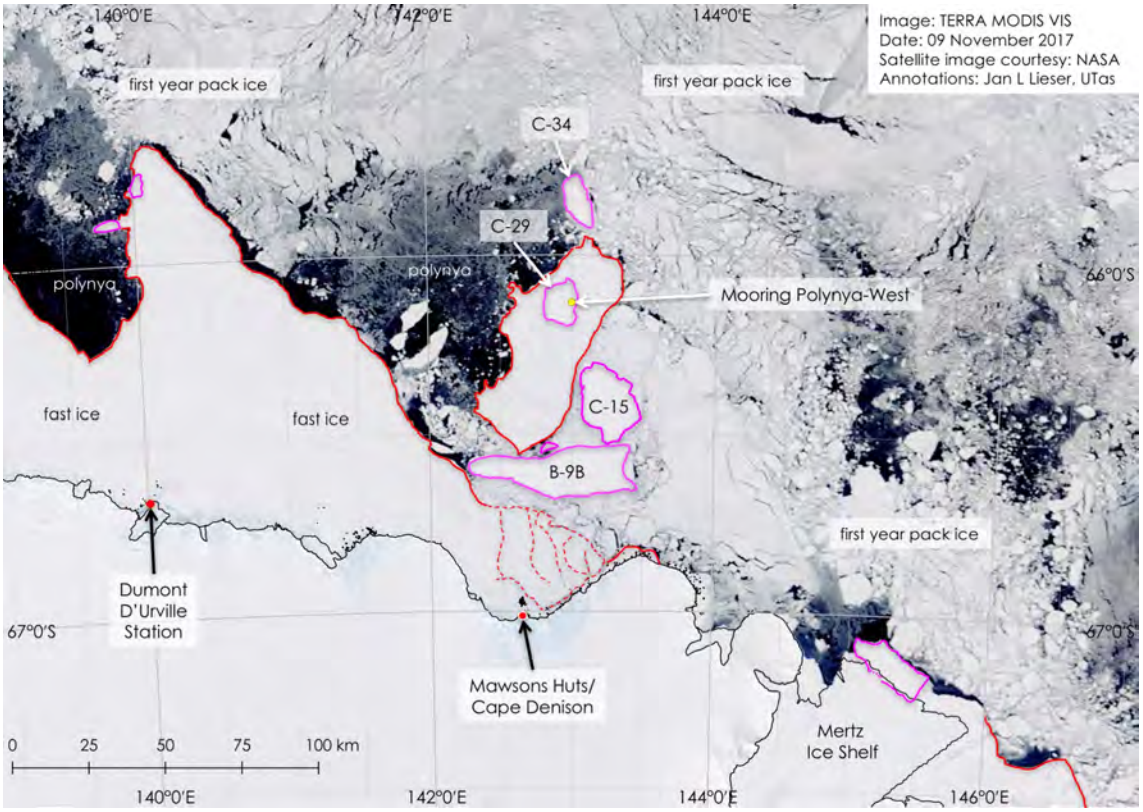

Figure 1: TERRA MODIS VIS scene acquired 09/11/2017 and provided by NASA.

As described in Sea Ice Report #46.2/2017, the connection between the body of shore-fast sea ice and fastened sea ice surrounding iceberg C-29 has collapsed and the now ex-fast ice is drifting northwestward into the polynya. Off Cape Denison, major cracks and breaks in the fast ice are marked by dashed, red lines.

Iceberg C-15 remains quite mobile and has rotated roughly 25 degrees anti-clockwise since 25/10/2017, while iceberg B-9B continues its east-west movement to and fro.

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Sea Ice Report #46.5/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

10/11/2017

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for October 2017.

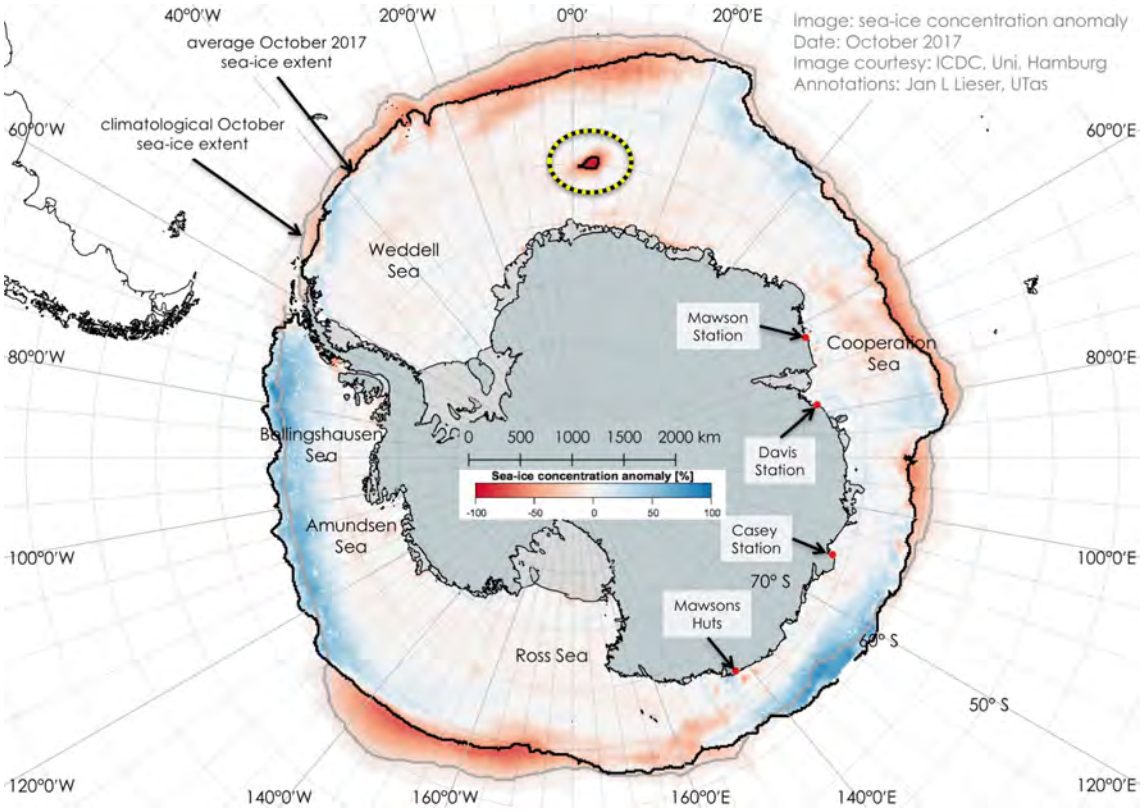

Figure 1: Sea-ice concentration anomaly for October 2017 provided by ICDC, Universtiät Hamburg.

After the annual sea-ice extent peaked on 09/10/2017, largely below average sea-ice concentration continues to dominate the regional picture around Antarctica, even though overall the Antarctic sea-ice extent was back within two standard deviations of the long-term average for the rest of October.

The presence of the Maud Rise Polynya (also referred to as Weddell Polynya), just east of 0° E (black-yellow circle), remains a prominent feature in the anomaly chart.

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Cooperation Sea

Figure 2 shows 24-hours sea-ice drift vectors (from 06/11/2017 12:00 UT to 08/11/2017 12:00 UT) and the sea-ice edge (blue contour), both derived from coarse-resolution sea-ice concentration data.

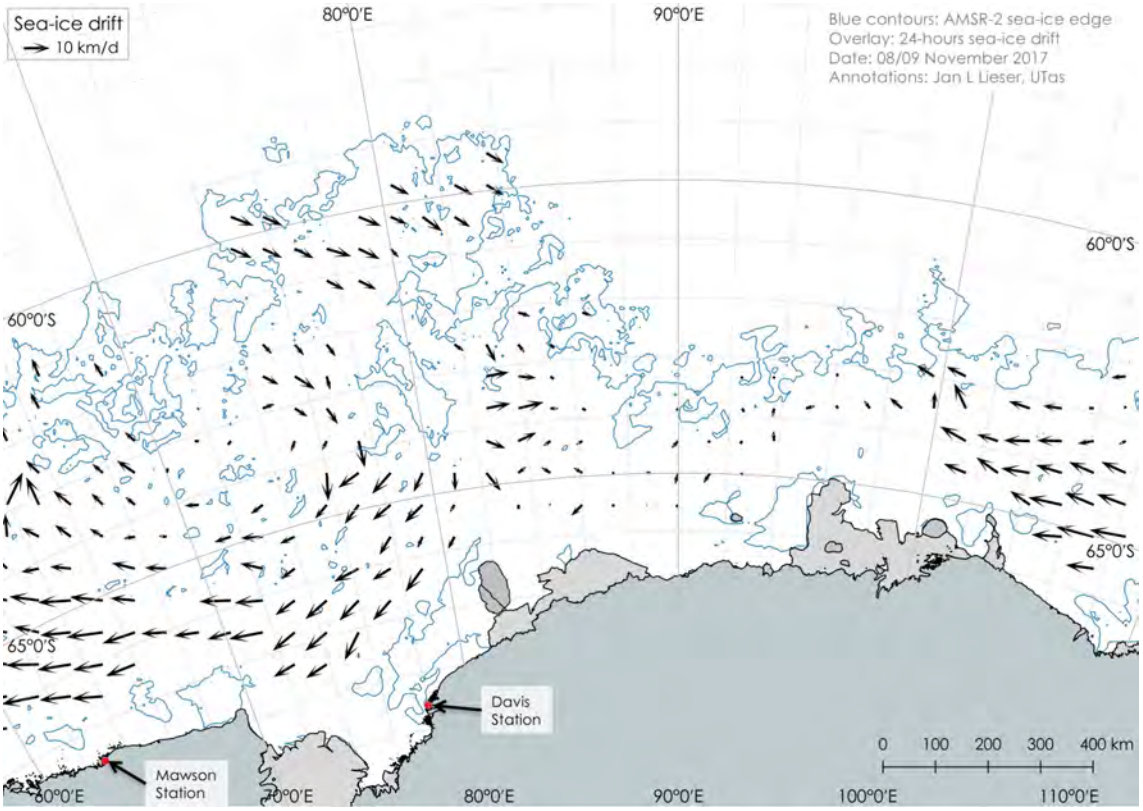

Figure 2: Sea-ice drift for 08/11/2017 provided by OSI SAF and sea-ice edge for 09/11/2017 provided by PolarView.

North of 65° S and west of 90° E, the patchiness of the sea-ice cover is illustrated by the ice-edge contours, which mark the edge of 15% sea-ice concentration, but the large polynya area north of Davis Station shows also clearly.

Davis Station

Figure 3 shows a visible scene of northern Ingrid Christensen Coast. The fast-ice edge from 06/11/2017 is given by the dashed, orange line.

The fast ice is retreating toward the coast, with the largest break-up next to the West Ice Shelf (visible only just in the northeastern corner of the Figure 3). But fast ice is also breaking at its edge off the Vestfold Hills, where approximately 3 km^2 have broken away (see red shape in magnified circle in Figure 3), which brings the fast-ice edge directly west of Davis Station roughly 1 km closer to the shore.

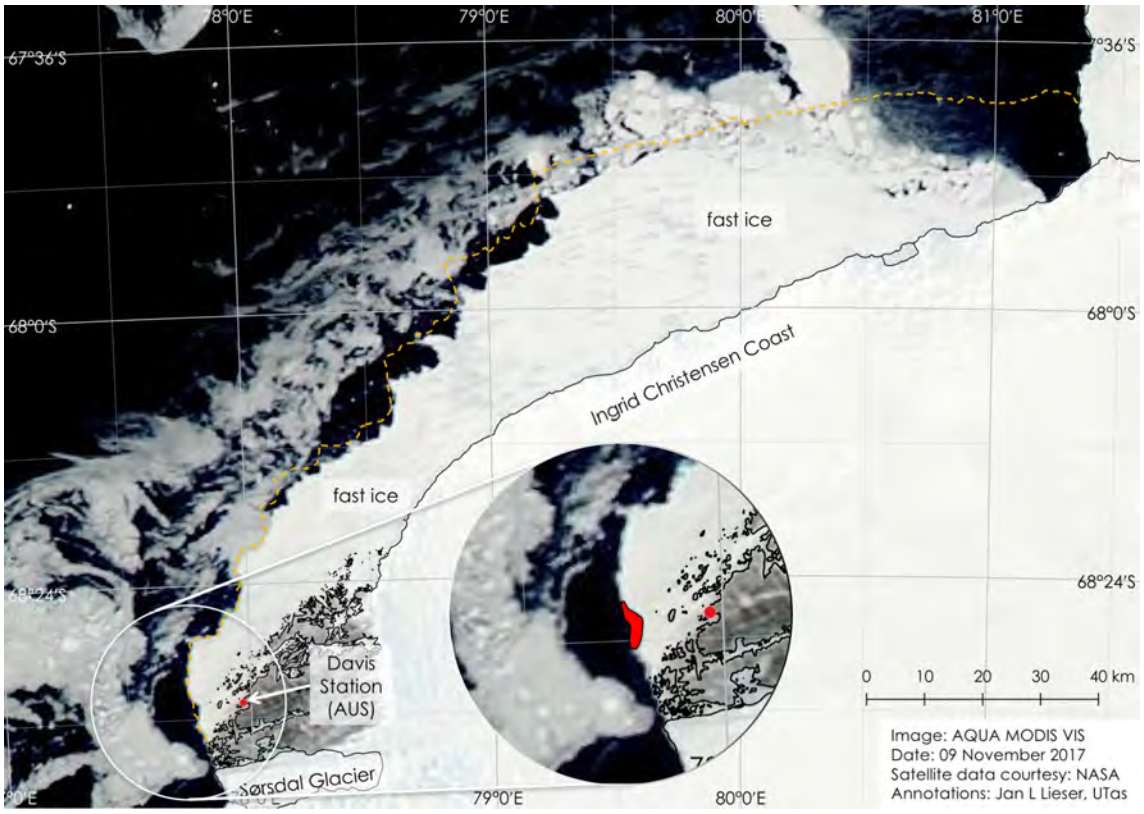

Figure 3: AQUA MODIS VIS scene acquired 09/11/2017 and provided by NASA.

Sea Ice Report #47.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

13/11/2017

Davis Station

Figure 1 shows a high-resolution SAR scene of the sea-ice region west of icebergs D-15A and D-15B. The cruise track of RSV *Aurora Australis* (up until 13/11/2017 03:30 UT) is given by the orange line.

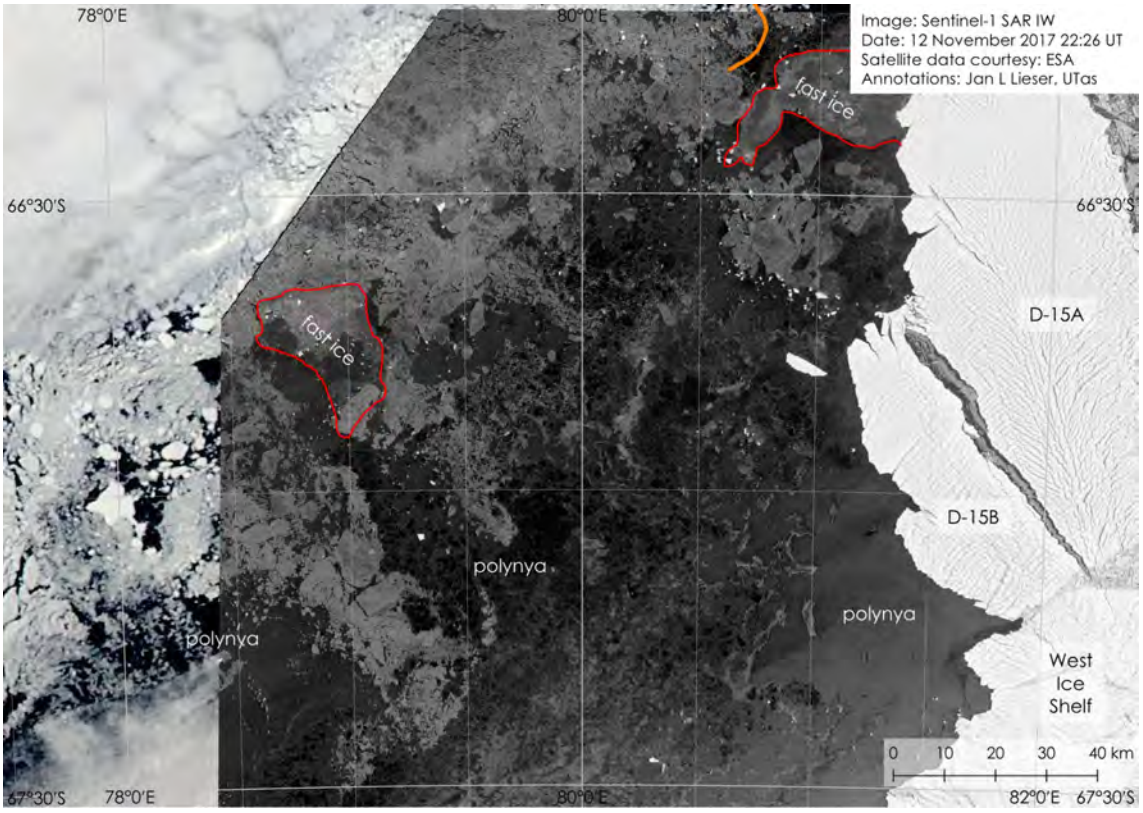

Figure 1: Sentinel-1b SAR IW scene acquired 12/11/2017 at 22:26 UT and provided by Drift + Noise Polar Services; complemented by AQUA MODIS VIS data acquired 12/11/2017 and provided by NASA.

Between the West Ice Shelf and the Vestfold Hills (Davis Station, see Figure 2), a large polynya is well established and only covered by loose patches of sea ice. But some larger floes of ex-fast ice are present in the sea-ice matrix off the fast-ice edge.

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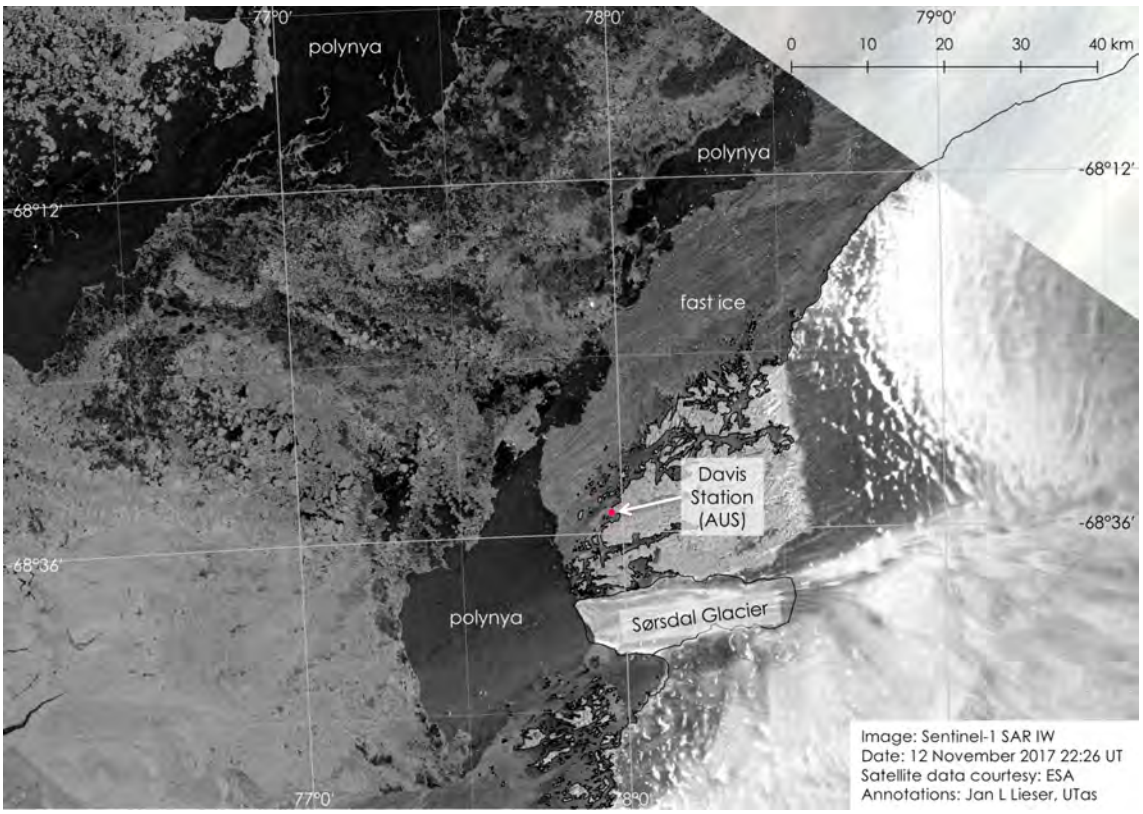

Figure 2: Sentinel-1b SAR IW scene acquired 12/11/2017 at 22:25 UT and provided by Drift + Noise Polar Services; complemented by AQUA MODIS VIS data acquired 12/11/2017 and provided by NASA.

D'Urville Sea

Figure 3 shows a visible scene of the coast between Dumont D'Urville Station and the Mertz Ice Shelf, and offshore.

Off Cape Denison, ex-fast ice can be seen broken up and drifting northeastward. Iceberg B-9B is continuing its slight east-west movements and iceberg C-15 is also still rotating.

Northwest of Dumont D'Urville Station, vast sheets of fast ice have broken off and are drifting in the polynya.

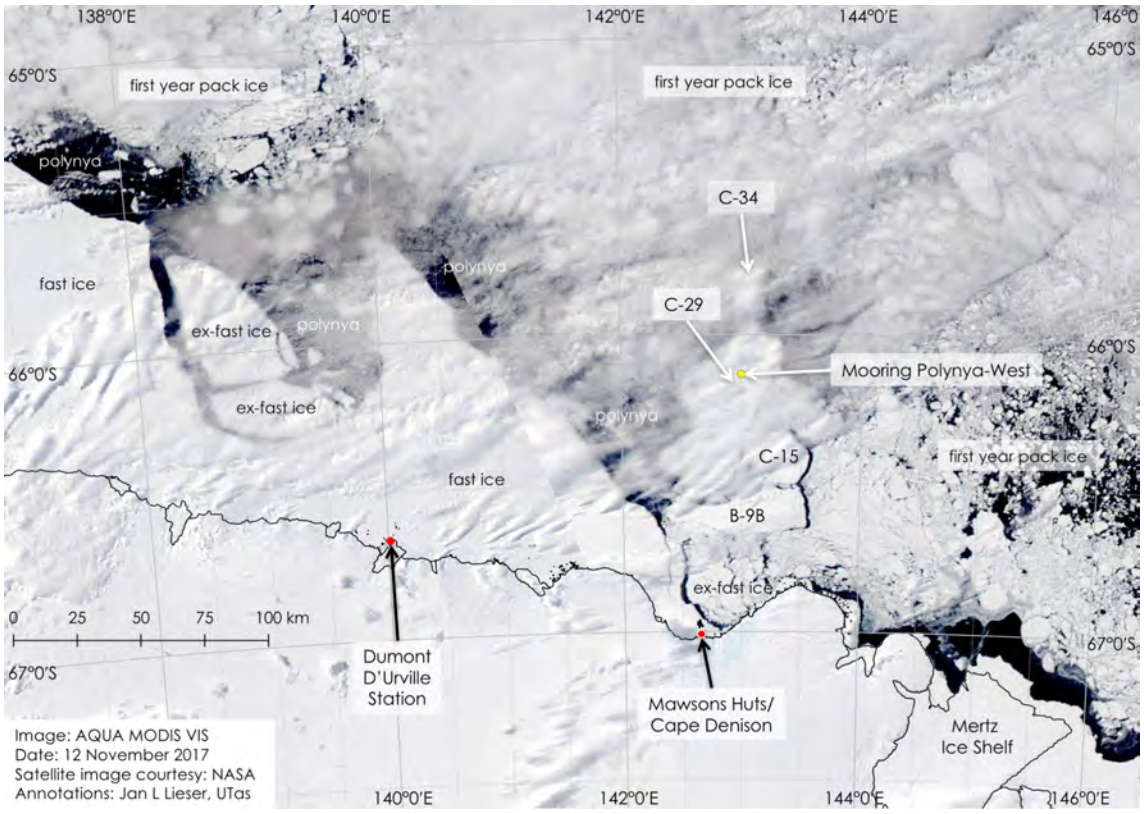

Figure 3: AQUA MODIS VIS scene acquired 12/11/2017 and provided by NASA.

Sea Ice Report #47.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

14/11/2017

Davis Station

Figure 1 shows high-resolution visible scene of Davis Station and vicinity. The cruise track of RSV *Aurora Australis* (up until 13/11/2017 23:00 UT) is given by the orange line.

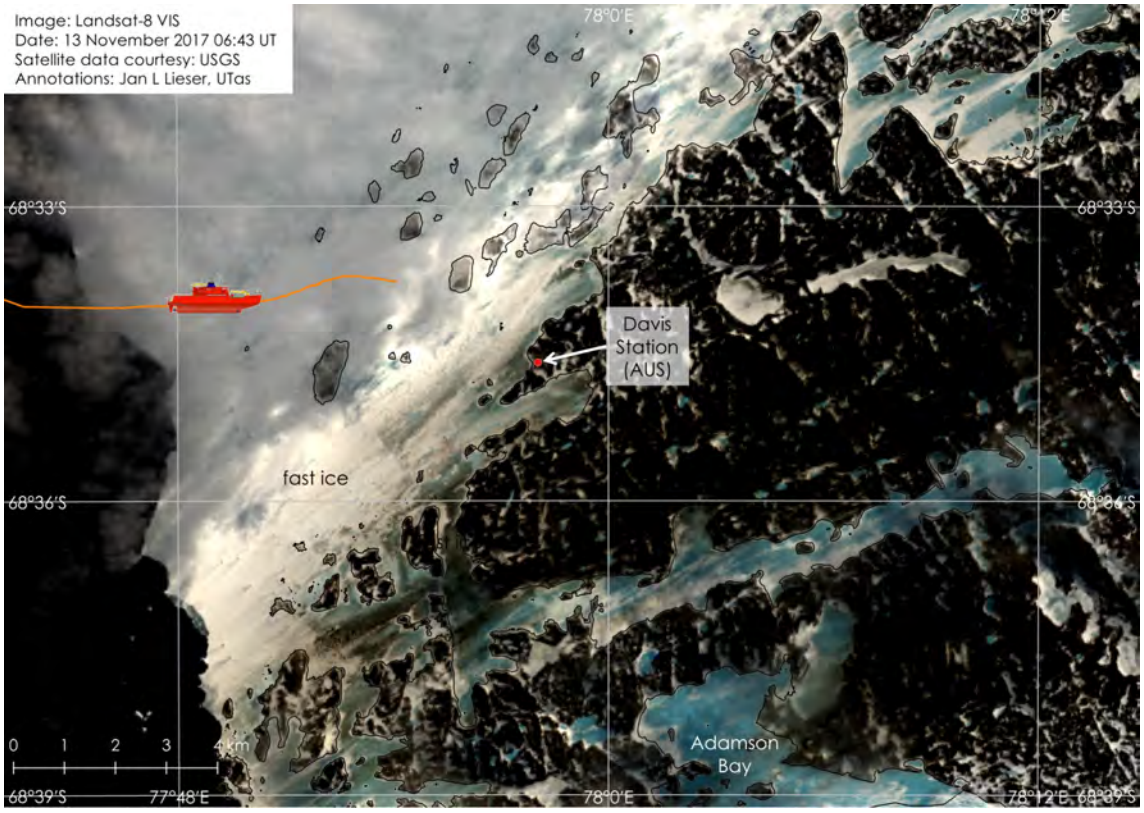

Figure 1: Landsat-8 VIS composite acquired 13/11/2017 at 06:43 UT and provided by USGS.

While the fast ice is largely obscured by clouds the Vestfold Hills are cloud free. Near shore and where broken clouds allow for an assessment of the fast-ice surface, patches of snow-free ice appear blueish or brown/dark grey in areas of sediment accumulation.

The hills appears largely free of snow cover, as well as the nearby lakes (for example Adamson Bay).

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Sea Ice Report #47.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

17/11/2017

East Antarctica

For the last week, Figure 1 shows a sea-ice concentration difference chart for East Antarctica, since RSV *Aurora Australis* traversed the sea-ice zone towards Davis Station.

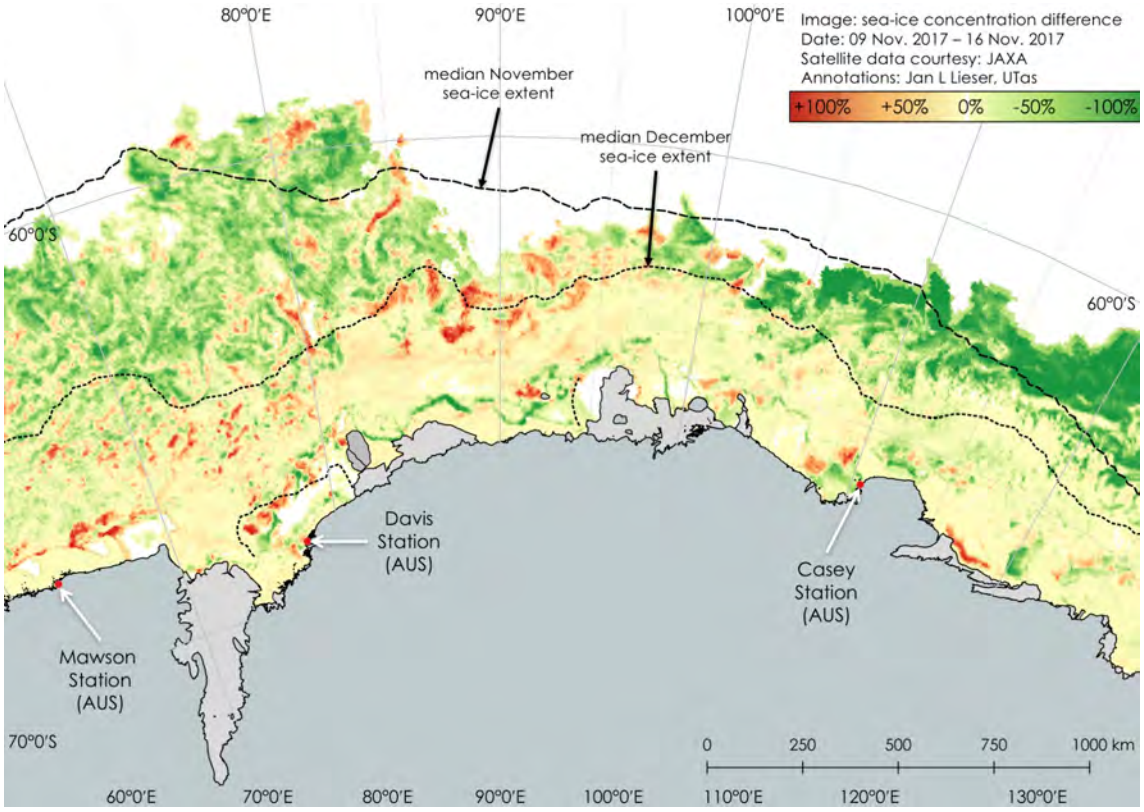

Figure 1: Sea-ice concentration difference based on data from 09/11/2017 - 16/11/2017, data provided by Universtiät Hamburg.

The rapid retreat of sea ice is the region (except for a small segment just east and west of 90° E) can be seen by the green shading, which is indicating less sea ice on 16/11/2017 compared to 09/11/2017.

West of 87° E, the boundary between the marginal ice zone and the higher-concentration pack ice has almost reached the median sea-ice extent for December already.

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D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea and the coast between Dumont D'Urville Station and the Mertz Ice Shelf. The positions of four large, tabular icebergs and the fast-ice edge on 09/11/2017 are given by dashed, pink and red lines, respectively.

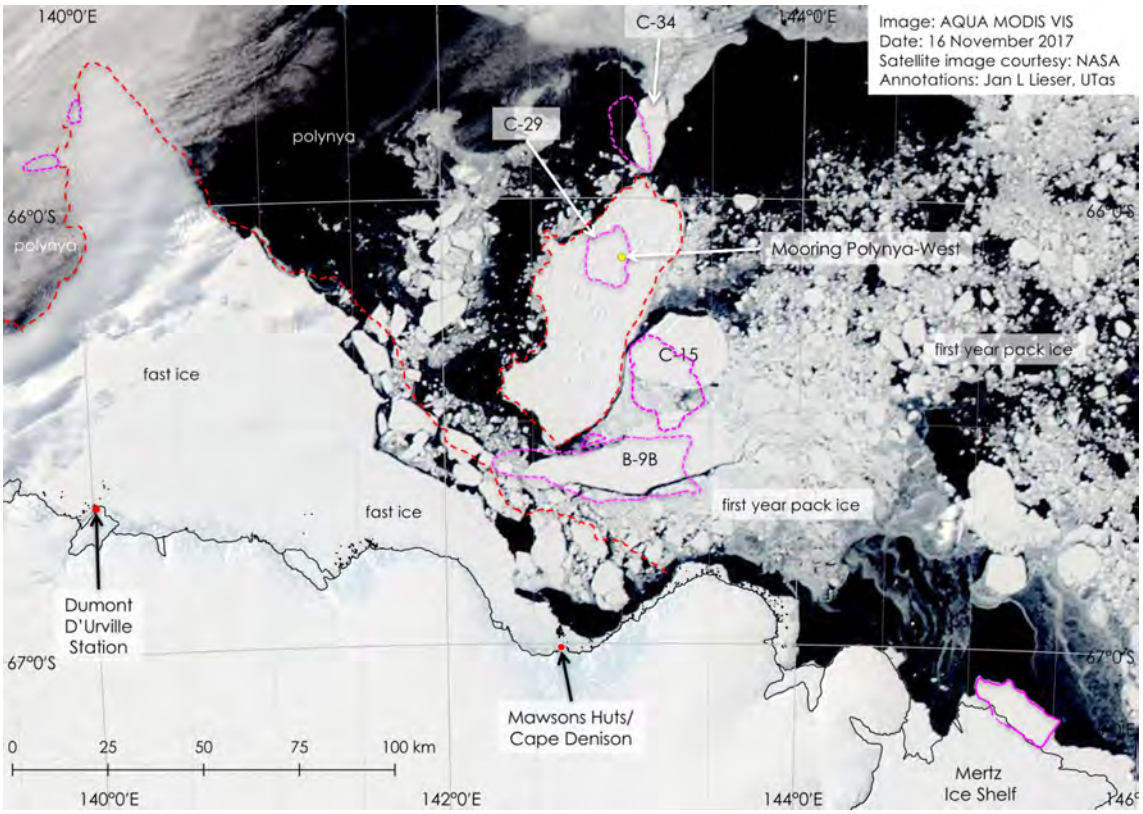

Figure 2: AQUA MODIS VIS scene acquired 16/11/2017 and provided by NASA.

Off Cape Denison, fast ice continues to break up. During the past week, iceberg B09B has travelled roughly 9.5 km eastward and rotated approximately 11 degrees anti-clockwise; iceberg C-15 has spun around about 75 degrees while touching the fast-ice edge to its west; iceberg C-29 has not moved at all and remains surrounded by fast ice, while iceberg C-34 appears grounded at its southern end and pivoted nearly 30 degrees clockwise.

Sea Ice Report #48.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

20/11/2017

East Antarctica

Figure 1 shows a sea-ice concentration chart for East Antarctica.

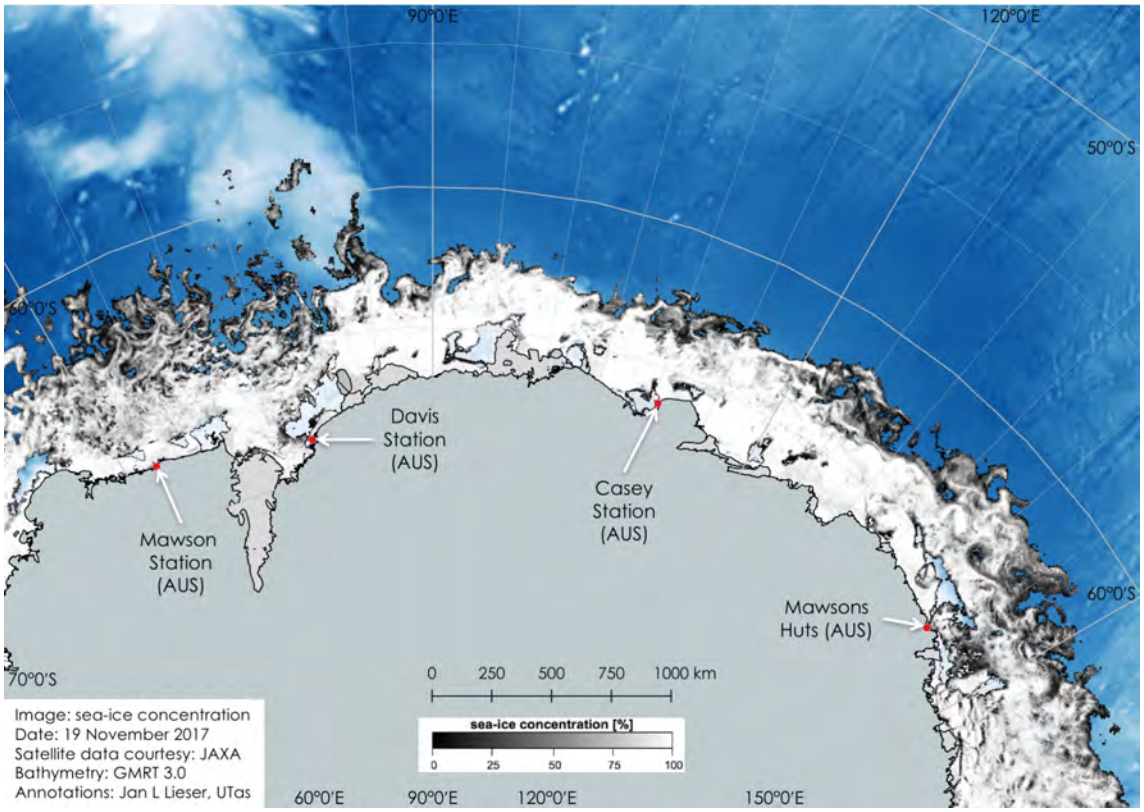

Figure 1: Sea-ice concentration acquired 19/11/2017 and provided by Universtiät Hamburg.

Lower sea-ice concentration and a fuzzy marginal ice zone can be found in the west of the map (west of 70° E) and in the east (east of 150° E), while in the central part of the map higher sea-ice concentration appears confined closer to the coast.

Mawson Station

Figures 2 and 3 show high-resolution visible scenes west and east of Mawson Station, respectively.

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Some shadows of high cirrus clouds can be seen on the ice surface; the western scene (Figure 2) is a little more affected by that than the eastern scene. Near the shoreline, the blank sea-ice surface is exposed.

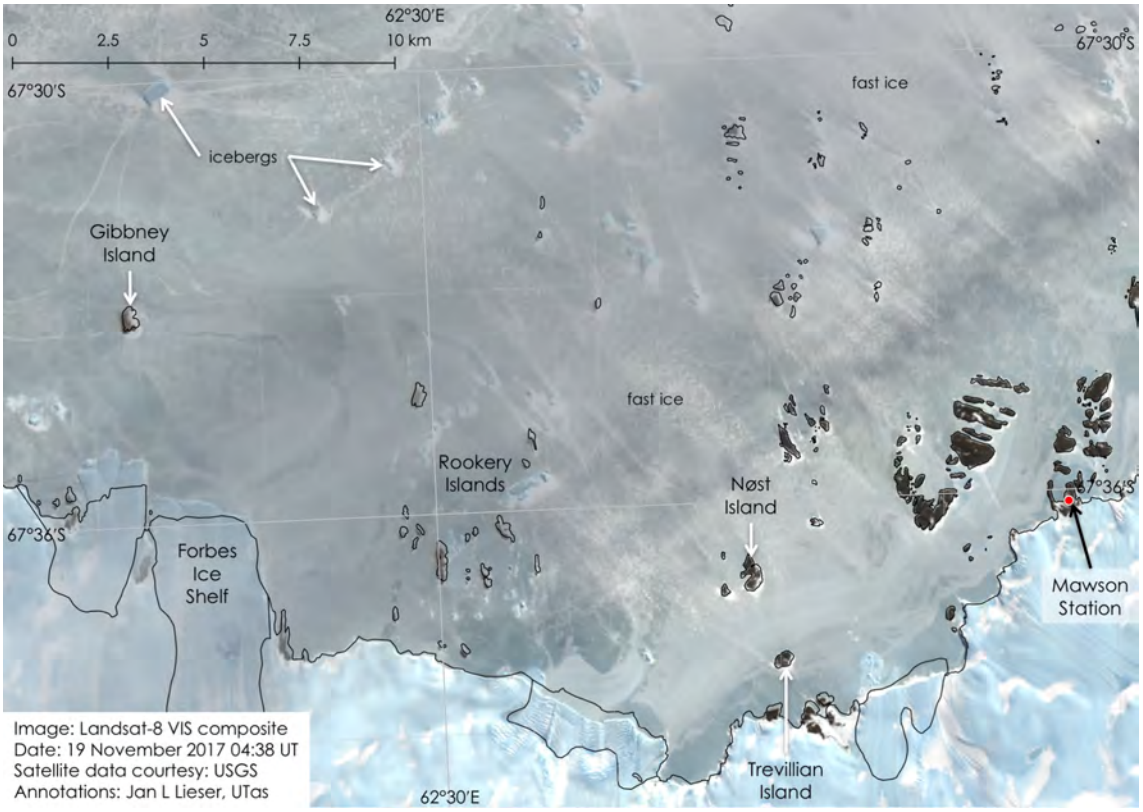

Figure 2: Landsat-8 VIS composite acquired 19/11/2017 at 04:38 UT and provided by USGS.

Between Forbes Ice Shelf and Mawson Station (Figure 2), the bare ice allows an assessment of different sea-ice types, which accumulated at different times before being incorporated into the fast ice. Between Nøst Island and Trevillian Island, a set of parallel lines indicates the accretion of wind-blown new ice when this area froze solid. Another prominent example of this is found off the ice shelf at 62° 35' E and 67° 38' S, where old sea-ice floes are separated from the shelf front by sea ice that formed much later than the floes. Similar (stripy) patterns can be seen west of Rookery Islands towards Forbes Ice Shelf, but those are due to the cloud shadows less obvious.

Large tide cracks radiate in all directions from Gibbney Island and the large, tabular icebergs northeast of it.

East of Mawson Station (Figure 3), fast ice between the shoreline and offshore islands appears bare of snow cover. Behind obstacles (islands or grounded icebergs), snow dunes and scouring can be seen. Towards Andrerson Island, no stripy patterns (as described above) are evident on the fast-ice surface.

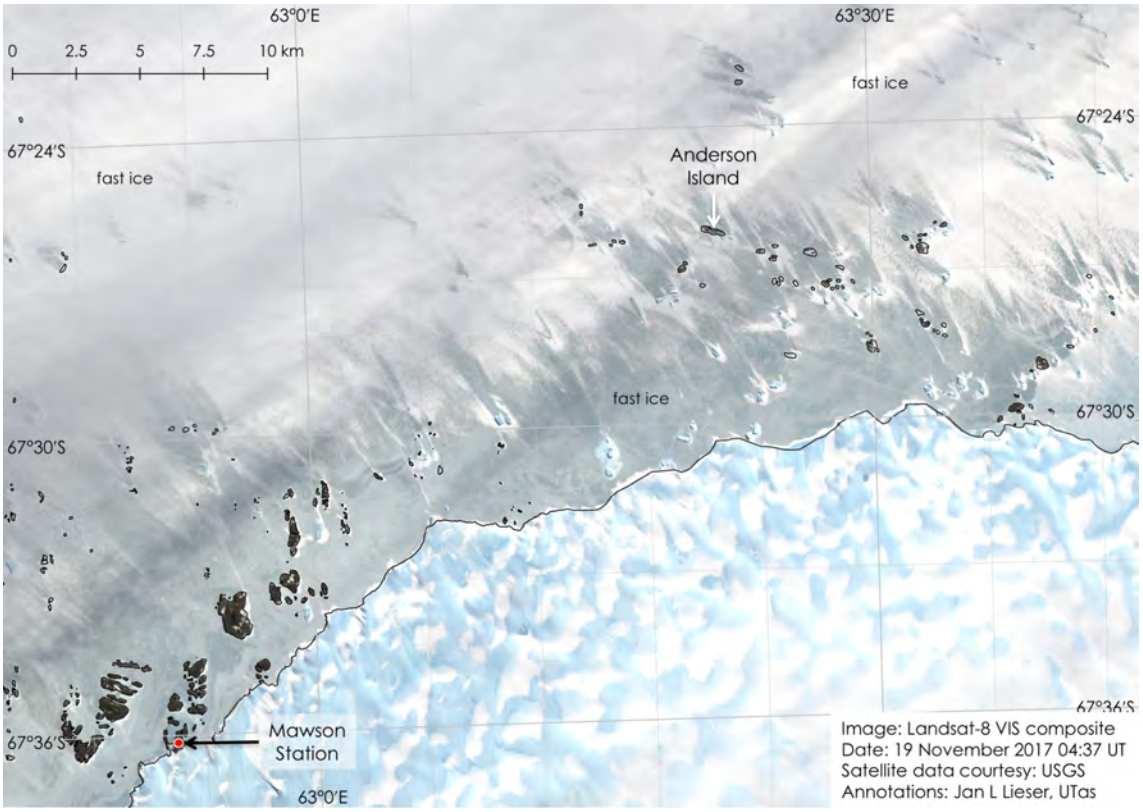

Figure 3: Landsat-8 VIS composite acquired 19/11/2017 at 04:37 UT and provided by USGS.

Sea Ice Report #48.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

21/11/2017

Cooperation Sea

Figure 1 shows visible scenes of eastern Cooperation Sea. On a background of MODIS visible data (at 250 m spatial resolution) is an overlay of three very high-resolution (30 m spatial) Landsat-8 scenes (blue tint).

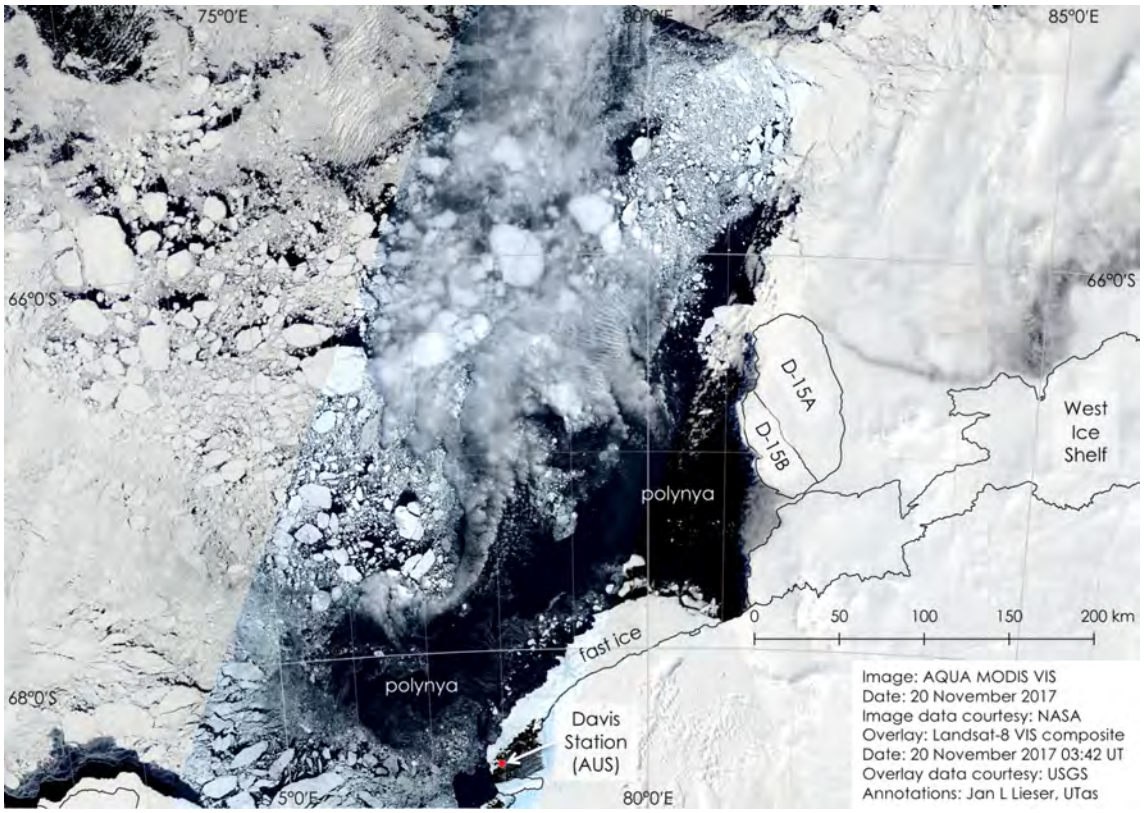

Figure 1: AQUA MODIS VIS scene acquired 20/11/2017 and provided by NASA; Landsat-8 VIS composite acquired 20/11/2017 at 03:42 UT and provided by USGS.

North of Davis Station, a large polynya is well established and only a small band (in terms of north-south extent) of higher concentration sea ice is still entering the area north of the Amery Ice Shelf (seen in the lower left corner of Figure 1). This band originates from a reservoir of sea ice north of the West Ice Shelf and contains some vast floes of sea ice, which are detectable through thin clouds of the Landsat-8 scenes.

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Davis Station

Figures 2 shows a very high-resolution (15 m) panchromatic scene of Davis Station and offshore.

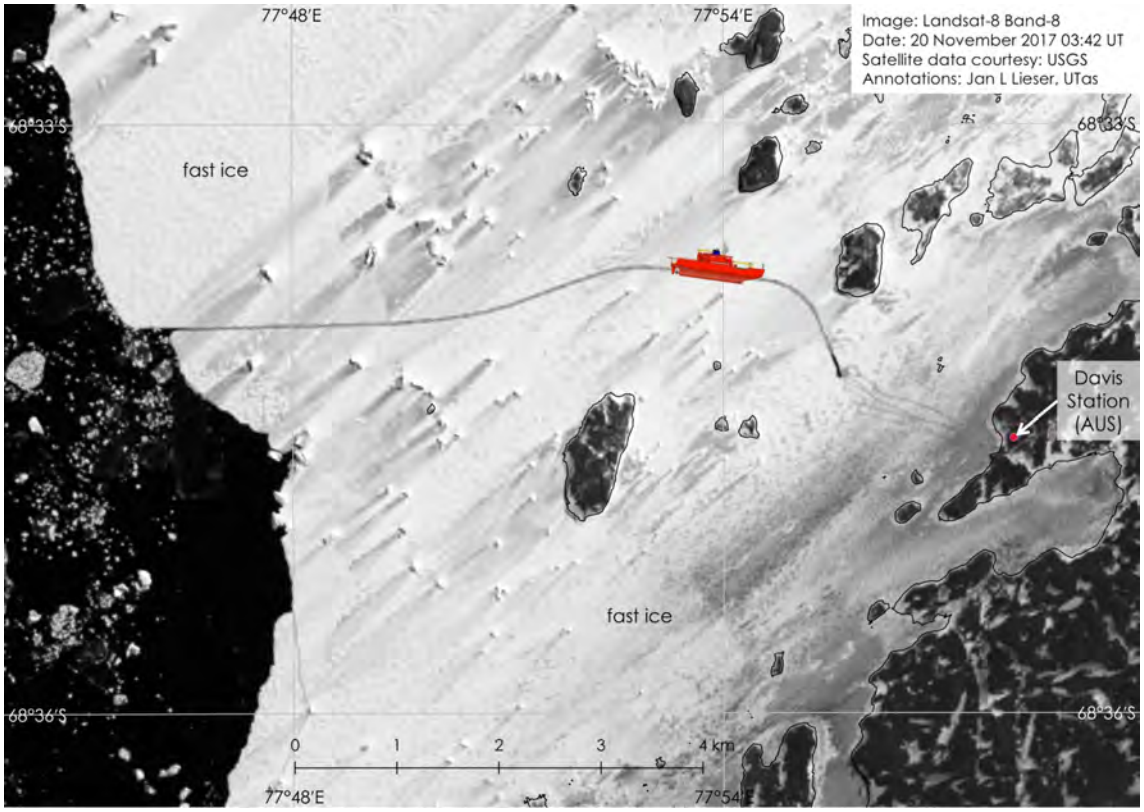

Figure 2: Landsat-8 panchromatic (Band-8) image acquired 20/11/2017 at 03:42 UT and provided by USGS.

The path that RSV *Aurora Australis* broke through the fast ice toward Davis Station can be seen and some open water behind the current parking position. Vehicle tracks between the ship and the shore are also visible.

Sea Ice Report #48.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

21/11/2017

East Antarctica

Figure 1 shows a high-resolution sea-ice concentration chart for East Antarctica. The red frame indicates the position of a Landsat-8 swath (see Sea Ice Report #48.2/2017).

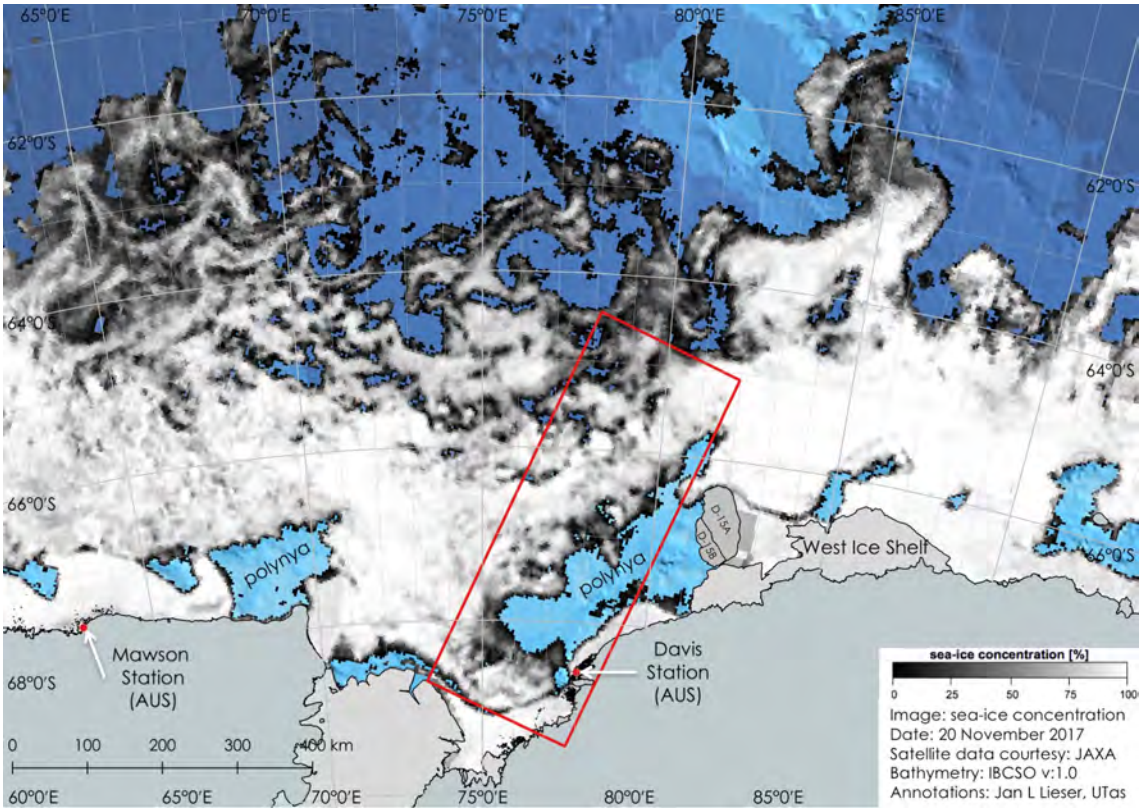

Figure 1: Sea-ice concentration acquired 20/11/2017 and provided by Universtiät Hamburg.

North of the polynya north of Davis Station, low sea-ice concentration dominates, except for a band of high-concentration sea ice moving westward fed by a reservoir of first-year sea ice north of the West Ice Shelf (see Sea Ice Report #48.2/2017).

Between 75° E and 80° E, the marginal ice zone reaches as far south as 65° 30' S.

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D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea.

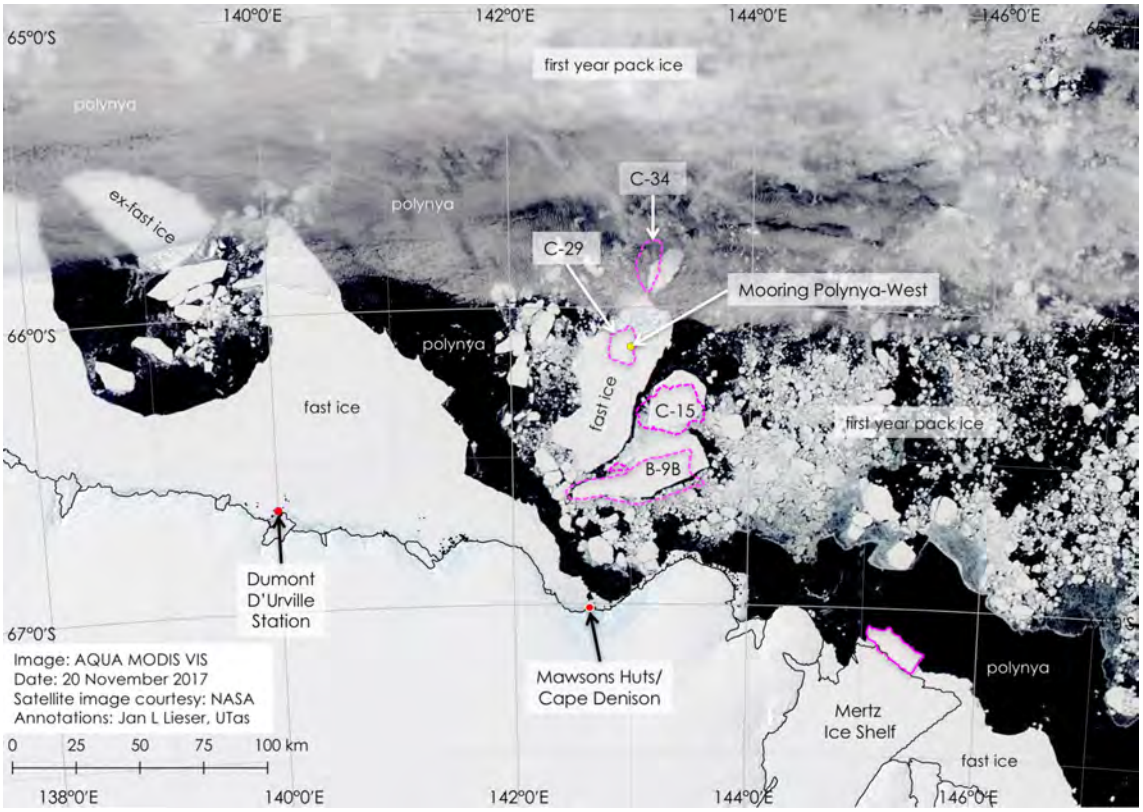

Figure 2: AQUA MODIS VIS scene acquired 20/11/2017 and provided by NASA.

Three large tabular icebergs continue drifting north of Cape Denison. Since 16/11/2017 (see Sea Ice Report #47.3/2017), iceberg B-9B has shifted northeastward and rotated roughly 7.5 degrees anti-clockwise, while iceberg C-15 turned approximately 33 degrees in the same rotational direction. Iceberg C-34 appears to have dragged its anchor point slightly and swivelled about 38 degrees clockwise. Iceberg C-29 remains local and surrounded by fast ice.

Westerly winds and offshore ice drift have created polynyas of various width between the first-year pack ice and the fast-ice edge, shoreline and shelf ice. West of 140° E, vast sheets of fast ice have broken off and can be seen drifting in the polynya. Off Mawsons Huts, the fast-ice edge has been stable since 16/11/2017.

Sea Ice Report #48.4/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

22/11/2017

Cooperation Sea

Figure 1 shows a visible scene of eastern Cooperation Sea. The yellow lines mark the 15% sea-ice edge based on coarse-resolution sea-ice concentration data for 21/11/2017. The slight mismatch between the sea-ice edge lines and the underlying imagery is due to the time difference of the respective spacecraft overpasses. The orange line is the cruise track of RSV *Aurora Australis* since she departed the fast ice off Davis Station (up to 22/11/2017 00:00 UT).

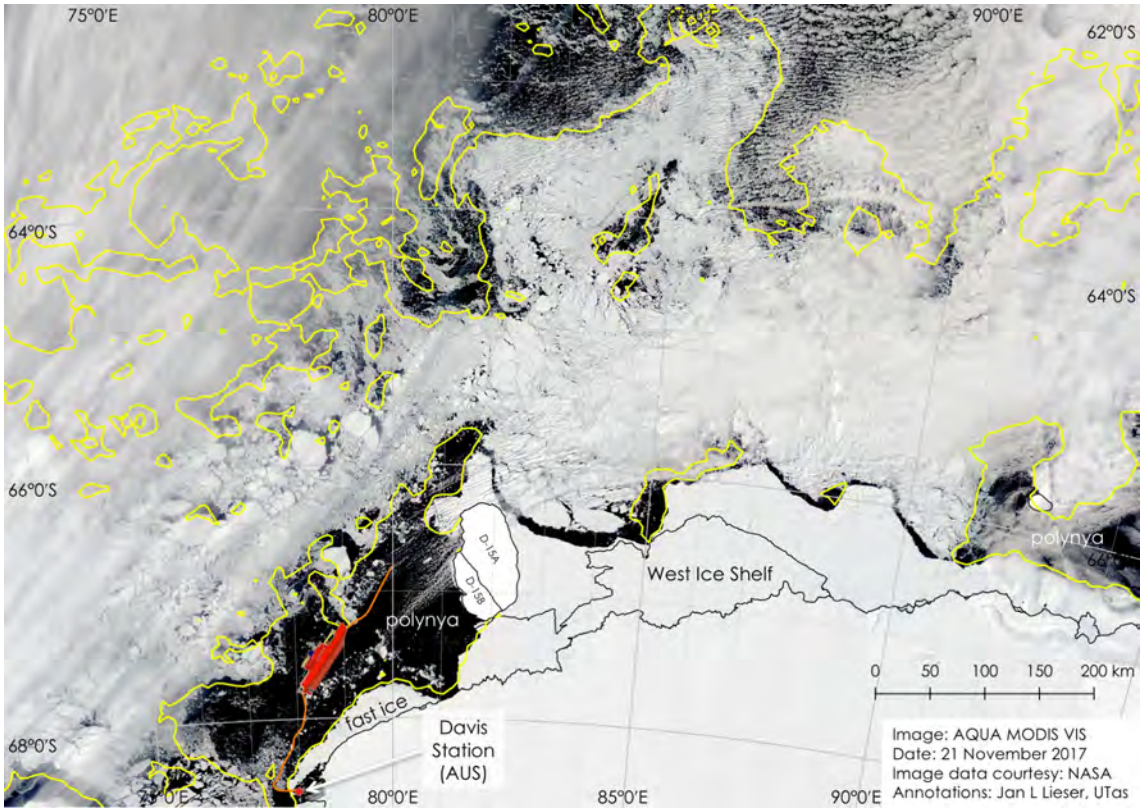

Figure 1: AQUA MODIS VIS scene acquired 21/11/2017 and provided by NASA.

North of the polynya north of Davis Station, a band of high-concentration sea ice continues to be fed by a reservoir of sea ice north of the West Ice Shelf. This band separates the polynya from the marginal ice zone.

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D'Urville Sea

Figure 2 shows a SAR scene of D'Urville Sea. The fast-ice edge is marked by red lines. Northwest of Dumont D'Urville Station, a red dot shows the current location of OPV *l'Astrolabe* (annotated by her callsign 'FASB'). The positions of large tabular icebergs are outlined by pink shapes, dashed shapes indicate yesterday's positions.

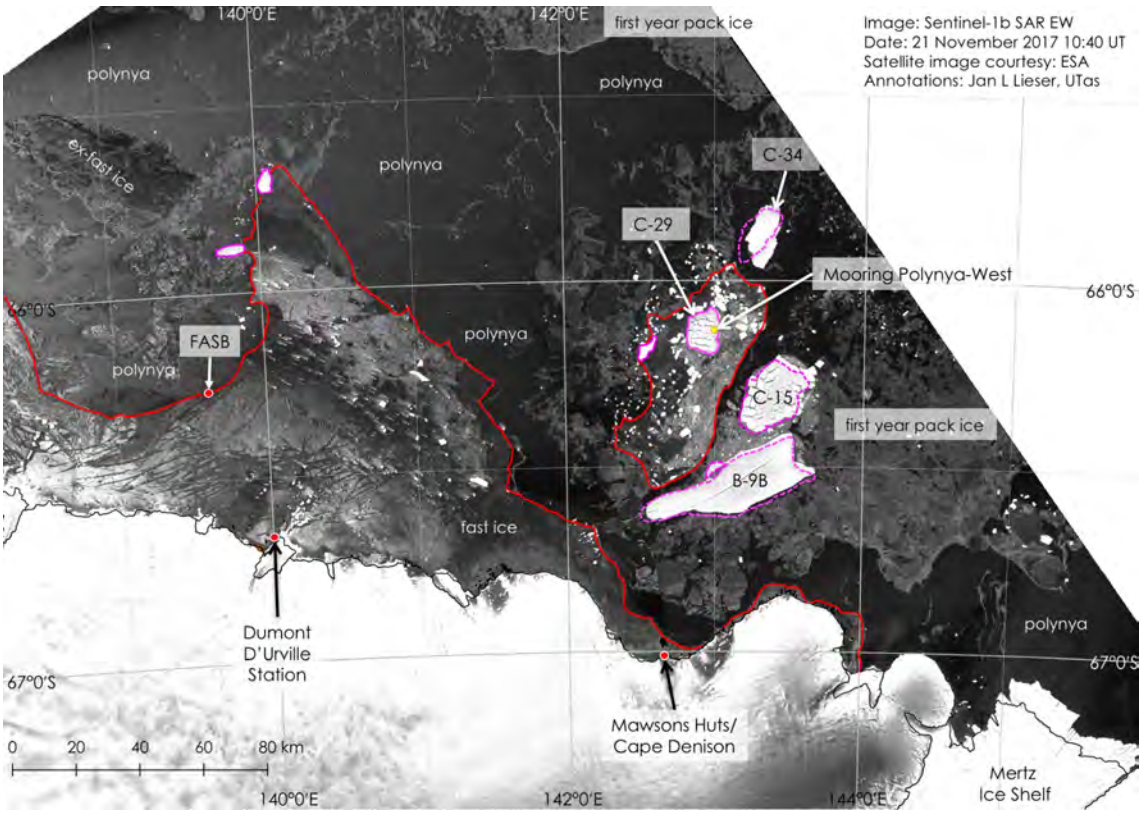

Figure 2: Sentinel-1b SAR EW scene acquired 21/11/2017 at 10:40 UT and provided by PolarView.

Further to Sea Ice Report #48.3/2017, three large tabular icebergs continue their drift north of Cape Denison. During the previous 24 hours, icebergs B-9B and C-15 shifted roughly 2 km northeastward and iceberg C-34 has freed its southern corner and moved it almost 5 km eastward.

North and northwest of Dumont D'Urville Station, the SAR scene also reveals a stripy pattern on the fast-ice surface. While this region appears largely homogenous white in visible imagery (for example MODIS data), the stripes indicate various ice types beneath. Dark stripes are interpreted as refrozen cracks after the initial sheet of fast ice got broken by wave and swell action during the freeze-up season.

Sea Ice Report #48.5/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

23/11/2017

Cooperation Sea

Figure 1 shows a composite of SAR and sea-ice concentration data of eastern Cooperation Sea. The yellow lines mark the 15% sea-ice edge based on the sea-ice concentration data shown. The orange line is the cruise track of RSV *Aurora Australis* since she departed the fast ice off Davis Station (up to 23/11/2017 00:00 UT).

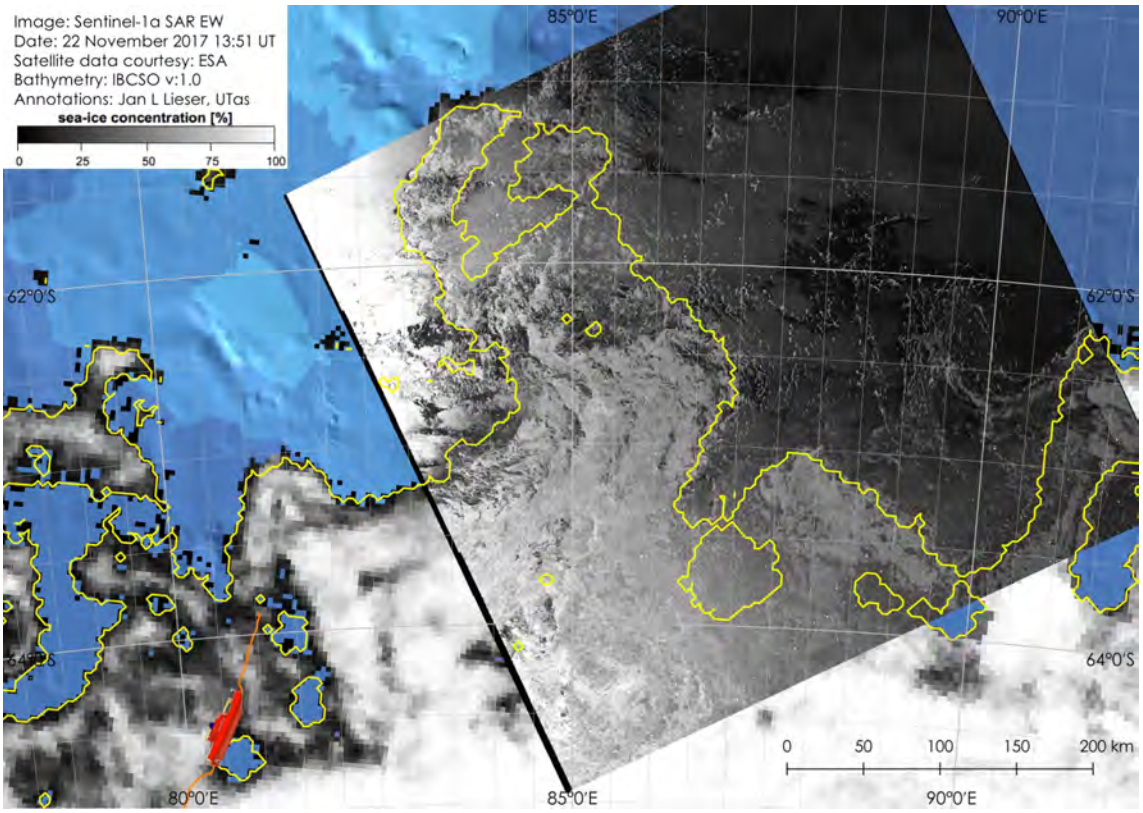

Figure 1: Sentinel-1a SAR EW scene acquired 22/11/2017 at 13:51 UT and provided by PolarView; background sea-ice concentration chart acquired 22/11/2017 and provided by Universtät Hamburg.

The sea-ice edge shows many northward extensions (hook-like patterns) of the higher-concentration pack ice. East of 80° E, the SAR scene reveals many strips and patches of sea ice and isolated icebergs east of the sea-ice edge as determined by the algorithm.

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Sea Ice Report #48.6/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

23/11/2017

Ross Sea

Figure 1 shows a composite of Synthetic Aperture RADAR (SAR) and high-resolution sea-ice concentration data of Ross Sea. The light blue line marks the 15% sea-ice edge based on the sea-ice concentration data shown.

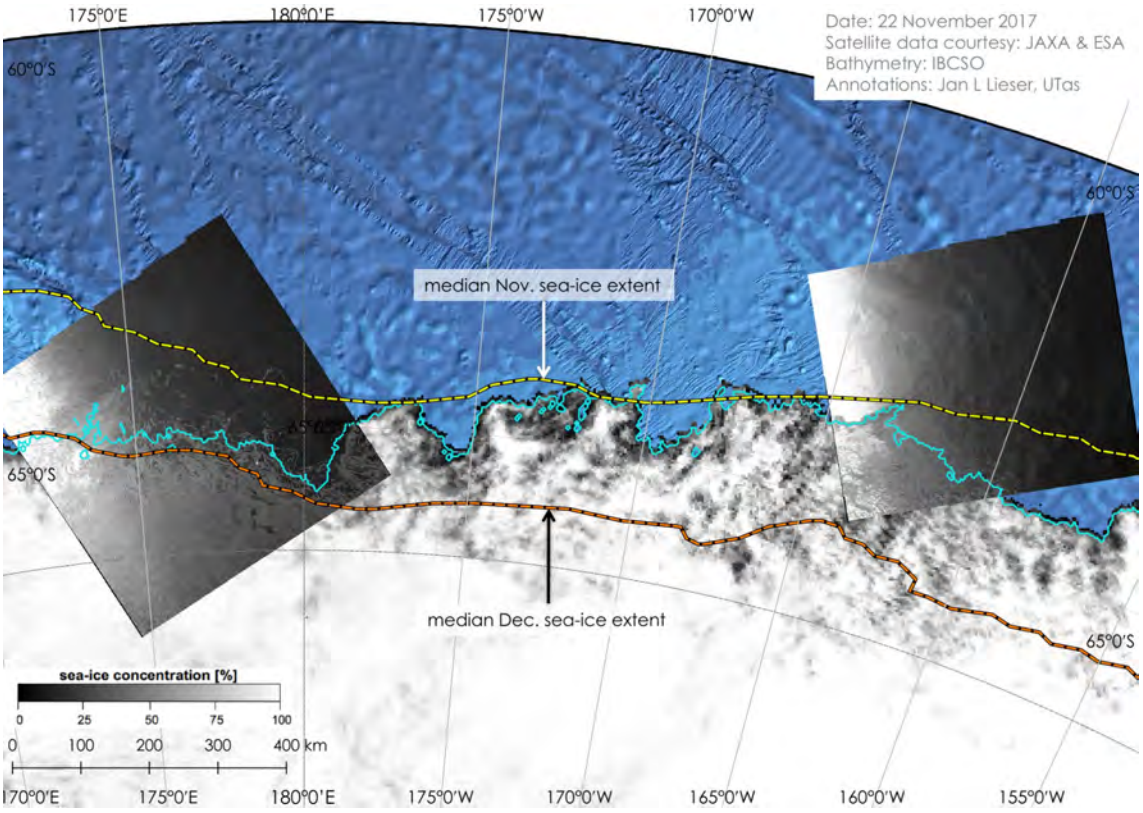

Figure 1: Sentinel-1b SAR EW scene acquired 22/11/2017 at 08:04 UT (western scene) and Sentinel-1b SAR EW scene acquired 22/11/2017 at 06:26 UT (eastern scene), both provided by PolarView; background sea-ice concentration chart acquired 22/11/2017 and provided by Universtät Hamburg.

West of 180° E, the sea-ice edge has already reached the December median sea-ice extent, however, as the SAR scene demonstrates, there are strips and patches of sea ice as far north as the November median sea-ice extent and further still. East of 180° E, the sea-ice edge as determined by the algorithm meanders between the November and

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December median extents. In general, sea ice floes can reasonably be expected up to 60 nautical miles north of the current sea-ice edge (light blue line).

The western SAR scene (see Figure 2) also shows icebergs north of the sea-ice edge and the November median extent. Some icebergs are marked by pink circles.

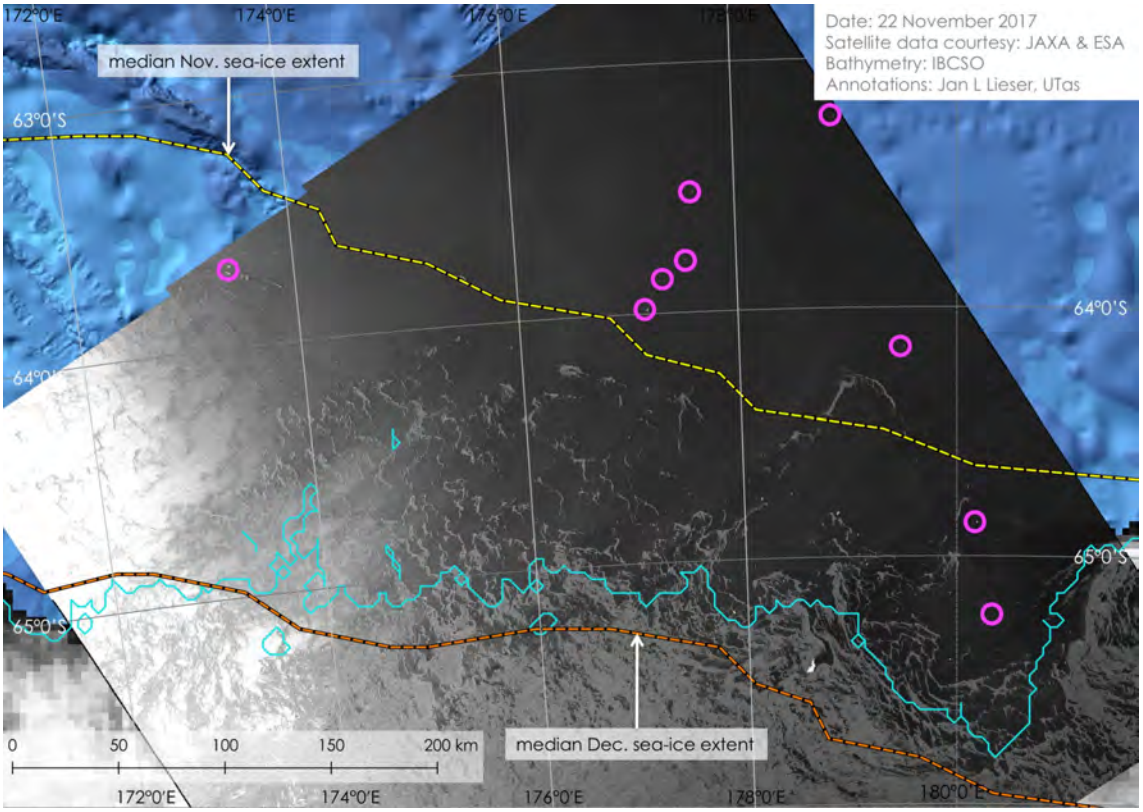

Figure 2: Detail of the western SAR scene of Figure 1.

Sea Ice Report #49.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

27/11/2017

Ross Sea

Figure 1 shows 24-hour sea-ice drift data for the Ross Sea. These drift data were derived from coarse-resolution sea-ice concentration data between 23/11/2017 12:00 UT and 25/11/2017 12:00 UT. The light blue line marks the 15% sea-ice edge also based on sea-ice concentration data.

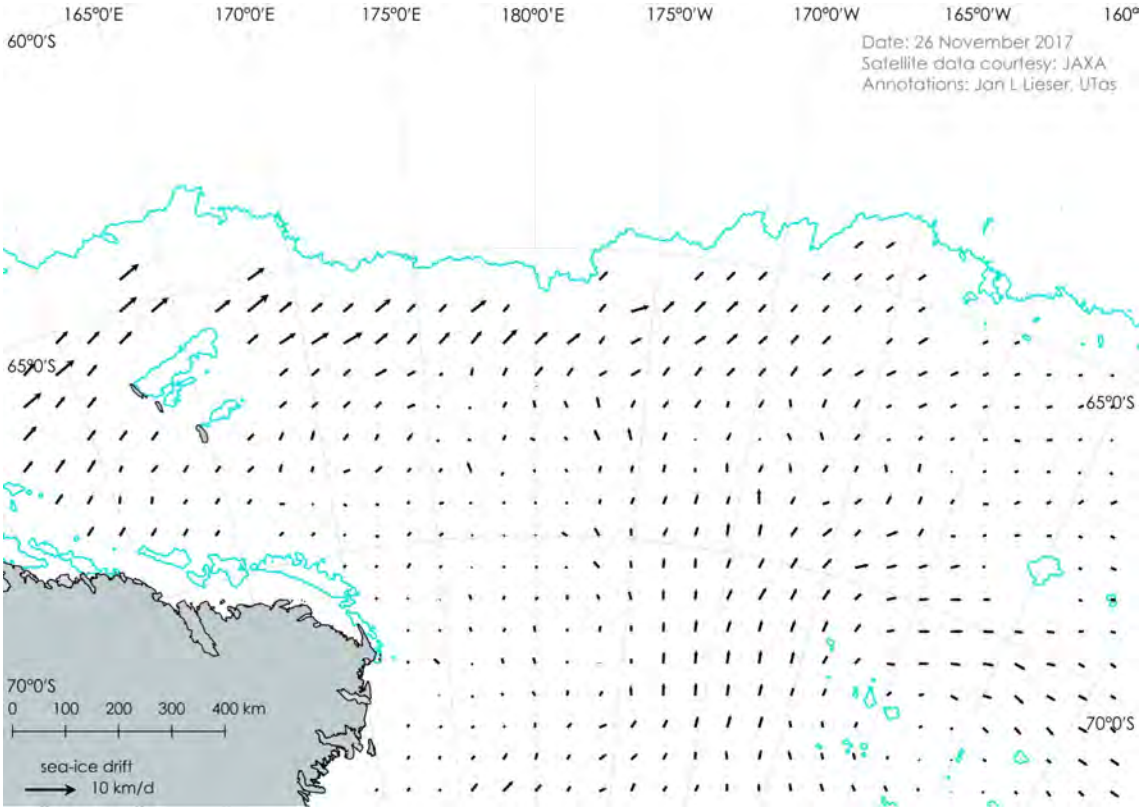

Figure 1: 24-hour sea-ice drift for 25/11/2017 (courtesy OSI-SAF) and sea-ice edge for 26/11/2017.

Sea-ice drift is only calculated for areas with sufficient sea-ice concentration, hence no values (vectors) for the sea-ice edge or near polynyas. The Balleny Islands (west of 165° E) act as a barrier to the drifting sea ice and polynyas can be seen in the lee of the islands. The general sea-ice drift of the marginal ice zone has been to the northeast following the predominant wind direction during the past few days. But strips and

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patches of thin sea ice have been observed on 24/11/2017 (in SAR imagery) well north of the 15% sea-ice edge (the basis of the blue line).

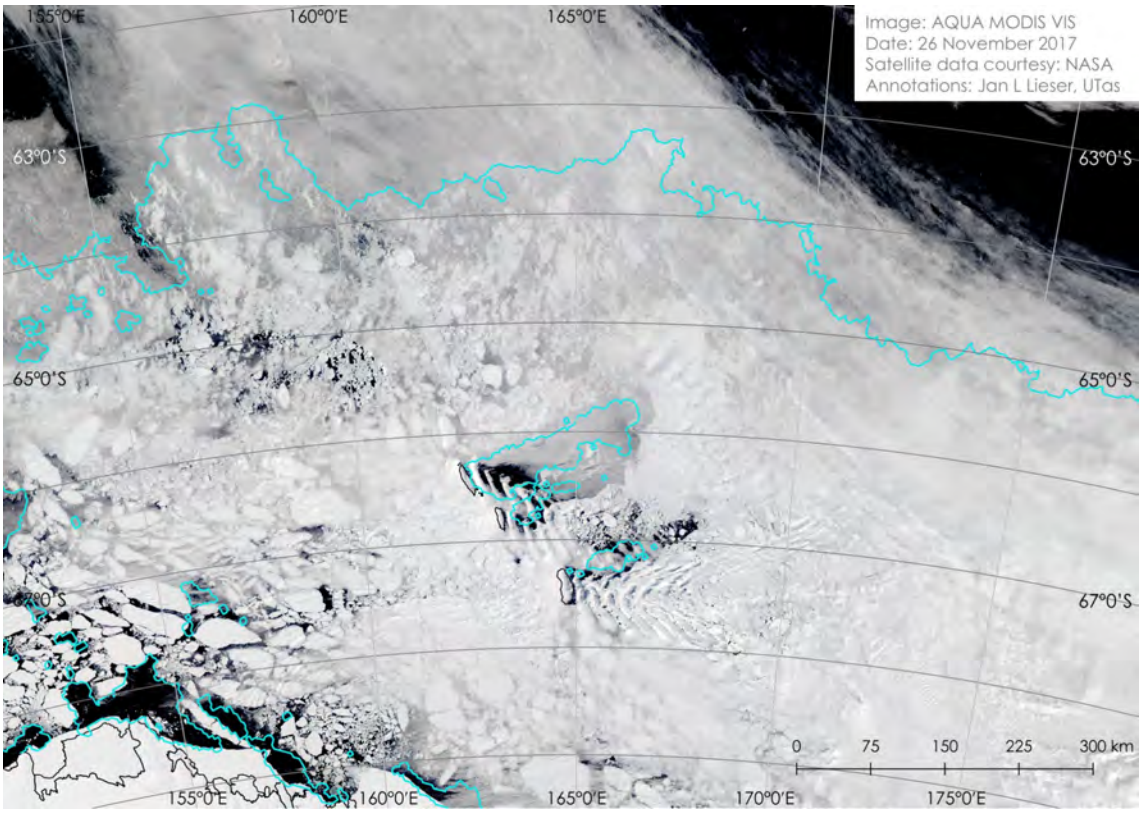

Figure 2: AQUA MODIS VIS scene acquired 26/11/2017 and provided by NASA.

Figure 2 illustrates the relation between the sea-ice edge (blue line) and higher resolution visible data. However, the visible data does not allow for a comparably robust large-scale sea-ice edge detection.

Within the marginal ice zone, larger patches of apparently open water can be seen in the visible data, but as the sea-ice edge (derived from sea-ice concentration data) shows a higher than 15% sea-ice cover, this can be expected in a 6.25 km by 6.25 km square, the basis unit area of the sea-ice concentration data.

Sea Ice Report #49.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

30/11/2017

Ross Sea

Figure 1 shows a sea-ice concentration chart with an overlay of two SAR scenes (holes along 180° E are a SAR-data processing artefact) for the Ross Sea.

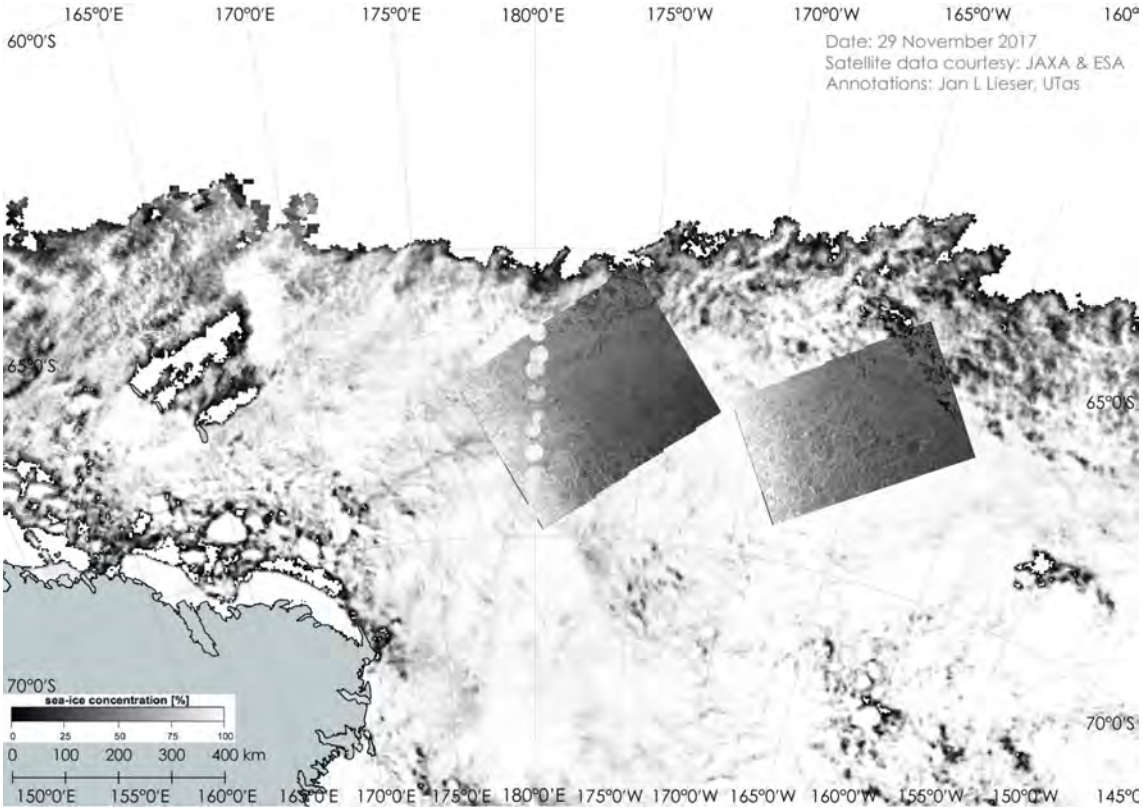

Figure 1: Sea-ice concentration acquired 29/11/2017 and provided by Universität Hamburg; overlay of SAR scenes: western frame Sentinel-1a SAR EW acquired 29/11/2017 at 07:07 UT, eastern frame Sentinel-1b SAR EW acquired 29/11/2017 at 07:55 UT, both SAR scenes provided by PolarView.

East of the Balleny Islands, the polynyas are growing, while the general drift of sea ice remains in northeasterly direction. North of the islands, the pack ice consists of largely loose floes with only one localised area of very high sea-ice concentration west of 170° E.

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Between 170° E and 180° E, the sea-ice edge appears compacted by strong westerly winds in the region, whereas east of 180° E, the sea-ice edge appears fuzzy and broken. However, the areas covered by the SAR scene in Figure 1 appear with a high-concentration sea-ice cover (80% to 100%) south of 66° S.

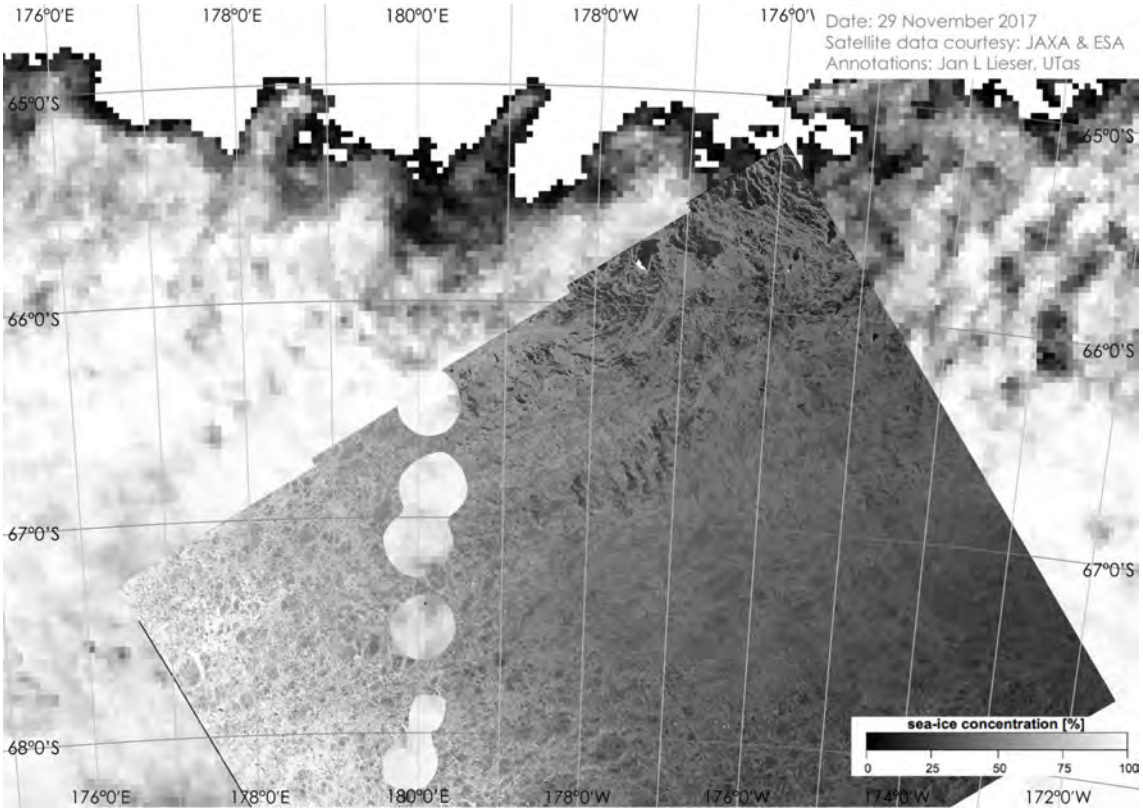

Figure 2: Detail of the western SAR scene of Figure 1.

Figure 2 illustrates the fuzziness of the sea-ice edge along 176° W. West of 179° E, the marginal ice zone appears to reach as far south as 66° S and locally, possibly even further.

Sea Ice Report #49.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

30/11/2017

Casey Station

Figure 1 shows a visible scene of Casey Station and the wider vicinity with an overlay of a SAR frame north of Law Dome.

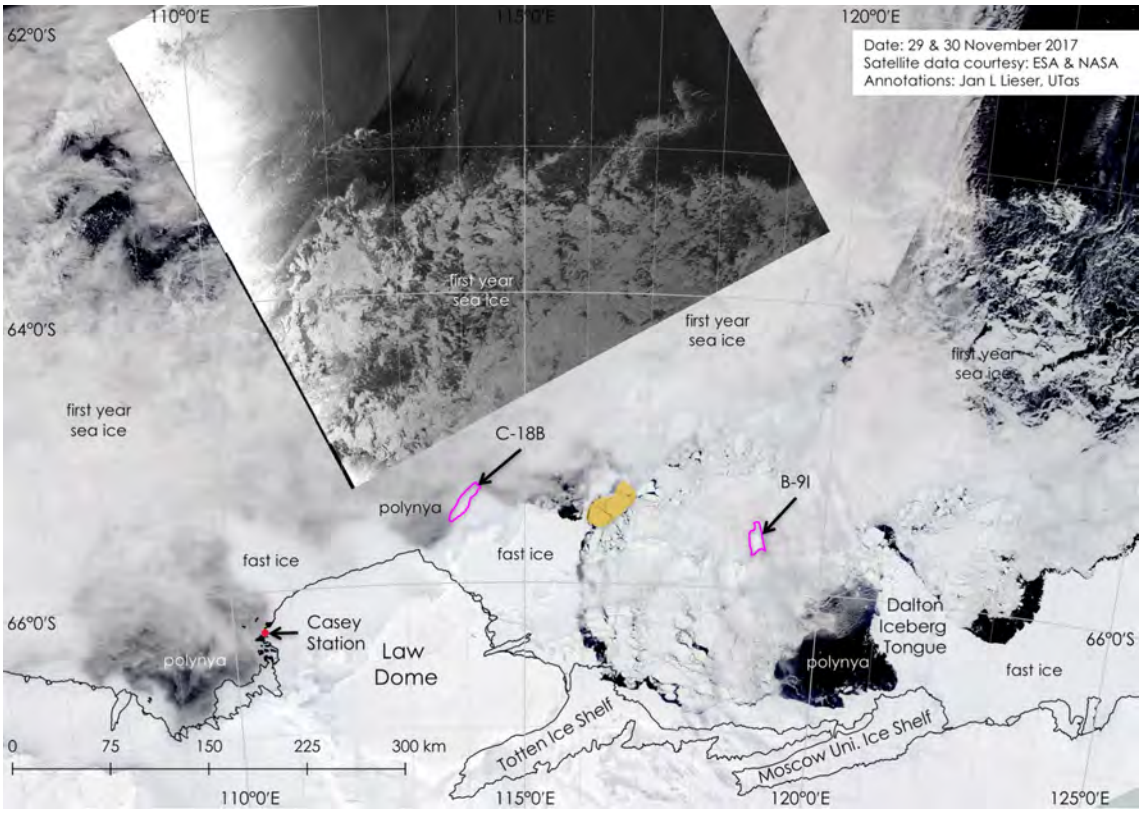

Figure 1: TERRA MODIS VIS scene acquired 30/11/2017 and provided by NASA; overlay of Sentinel-1a SAR EW acquired 29/11/2017 at 12:04 UT and provided by PolarView.

The marginal ice zone has progressed southward almost to the fast-ice edge or coast. The fuzziness of the sea-ice edge can clearly be seen in the SAR data, where strips and patches of sea ice meander northward. North of 63° S, a large number of isolated icebergs can also be detected in the high-resolution SAR scene.

Northeast of Law Dome, a large area of fast ice (roughly 650 km^2 marked by the orange shape) broke off the northeastern corner on 28/11/2017.

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Sea Ice Report #49.4/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

01/12/2017

D'Urville Sea

Figure 1 shows a SAR scene of D'Urville Sea. Dashed, pink lines mark the positions of large tabular icebergs on 21/11/2017 and a dotted red line gives the fast-ice edge on the same date (see Sea Ice Report #48.4/2017).

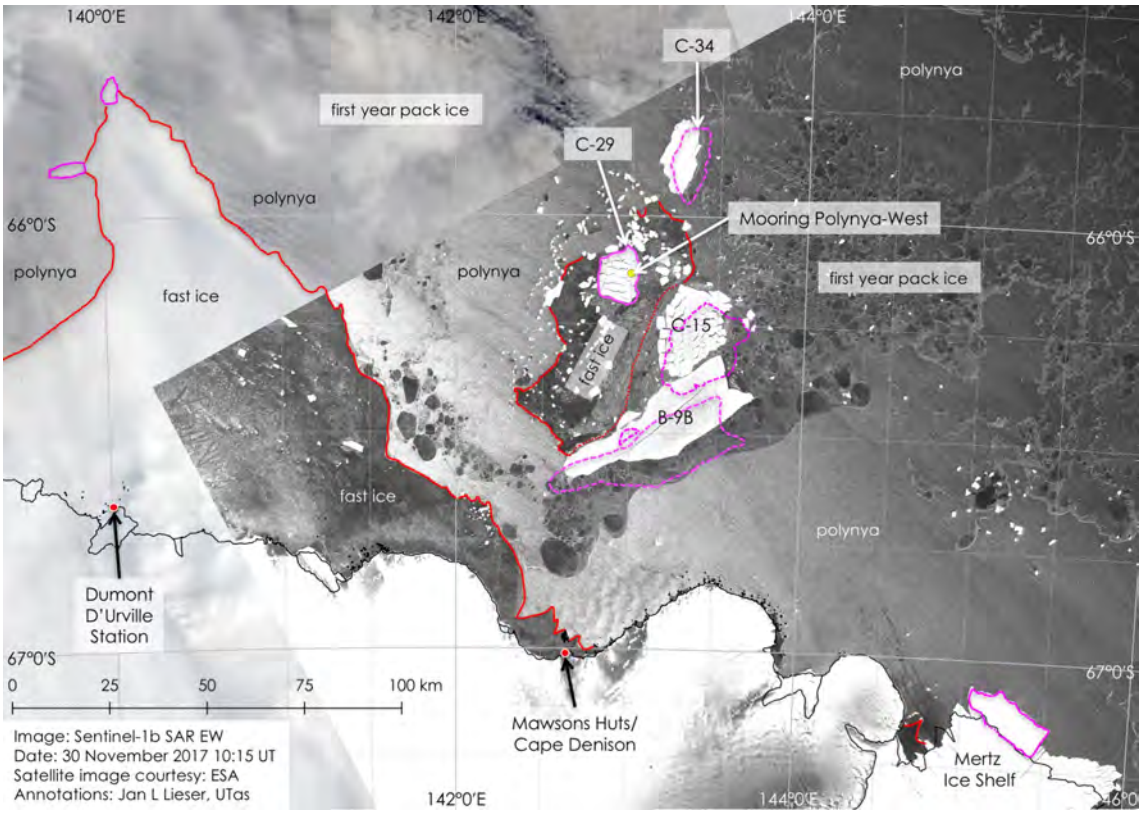

Figure 1: Sentinel-1a SAR EW acquired 30/11/2017 at 10:15 UT and provided by PolarView; complemented by AQUA MODIS VIS scene acquired 30/11/2017 and provided by NASA.

Off Cape Denison, fast ice continues to break up and the coast east from the cape is almost entirely free of fast ice towards the Mertz Ice Shelf.

Icebergs B-9B and C-15 continue their northward journey but have been pushed against fast ice surrounding iceberg C-29 by recent southeasterly winds. Iceberg C-34 is also still drifting westward.

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Sea Ice Report #50.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

04/12/2017

Ross Sea

Figure 1 shows a sea-ice concentration chart for the Ross Sea with an overlay of 24-hour sea-ice drift data derived from coarse-resolution sea-ice concentration data between 30/11/2017 12:00 UT and 02/12/2017 12:00 UT. A SAR scene is also shown (holes along 180° E are a processing artefact). The black-yellow line marks the December median sea-ice extent.

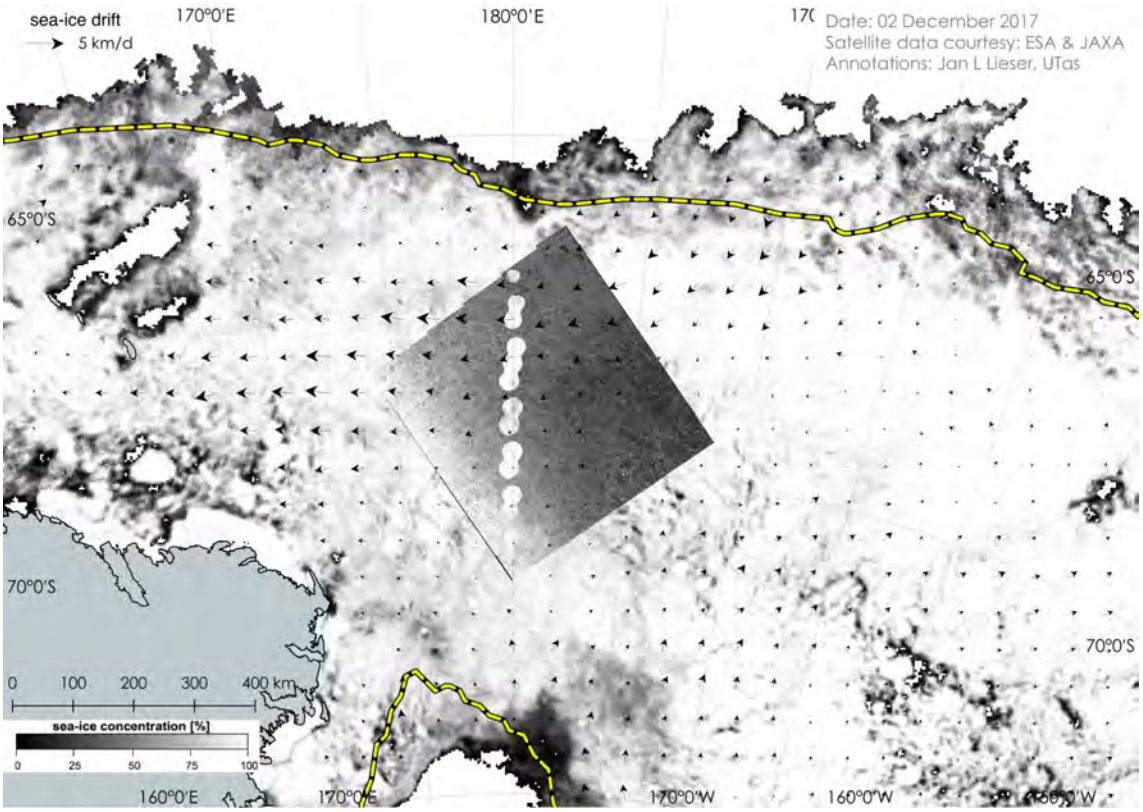

Figure 1: AMSR-2 sea-ice concentration for 03/12/2017 provided by Universität Hamburg, 24-hour sea-ice drift for 02/12/2017 (courtesy OSI-SAF) and Sentinel-1a SAR scene acquired 03/12/2017 at 08:12 UT and provided by PolarView.

For the area shown in the figure, the sea-ice edge has almost reached the median sea-ice extent for December already, but the central sea-ice pack still shows large areas of high concentration. Sea-ice drift appears low in the region and in various directions.

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Sea Ice Report #50.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

04/12/2017

Casey Station

Figure 1 shows a visible scene of Casey Station and the wider vicinity with an overlay of a SAR frame north of Law Dome.

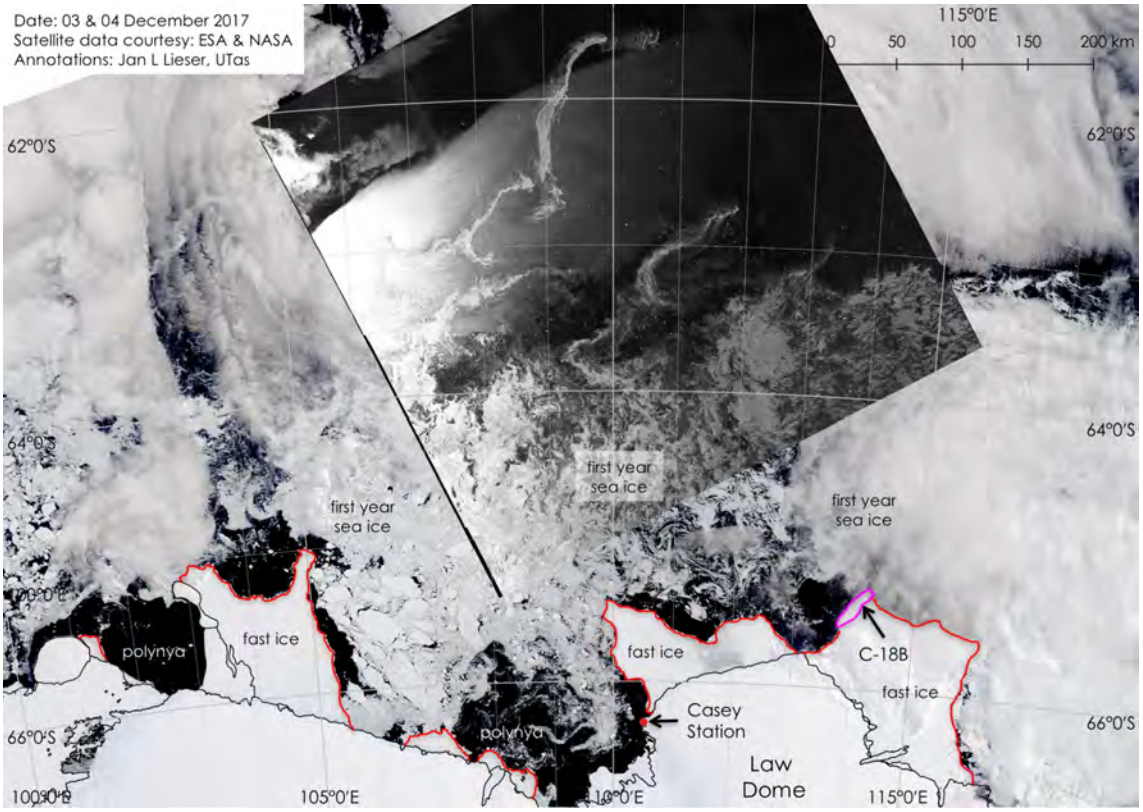

Figure 1: TERRA MODIS VIS scene acquired 04/12/2017 and provided by NASA; overlay of Sentinel-1a SAR EW acquired 03/12/2017 at 12:20 UT and provided by PolarView.

North of Law Dome, the pack ice is largely loose and dispersing. Some spit-like extensions of sea ice can be seen in the SAR scene of Figure 1 meandering north of the pack ice.

Fast ice continues to break up the region and only very little fast ice is still offshore Casey Station (see Figure 2 for high resolution SAR scene of Casey Station and vicinity).

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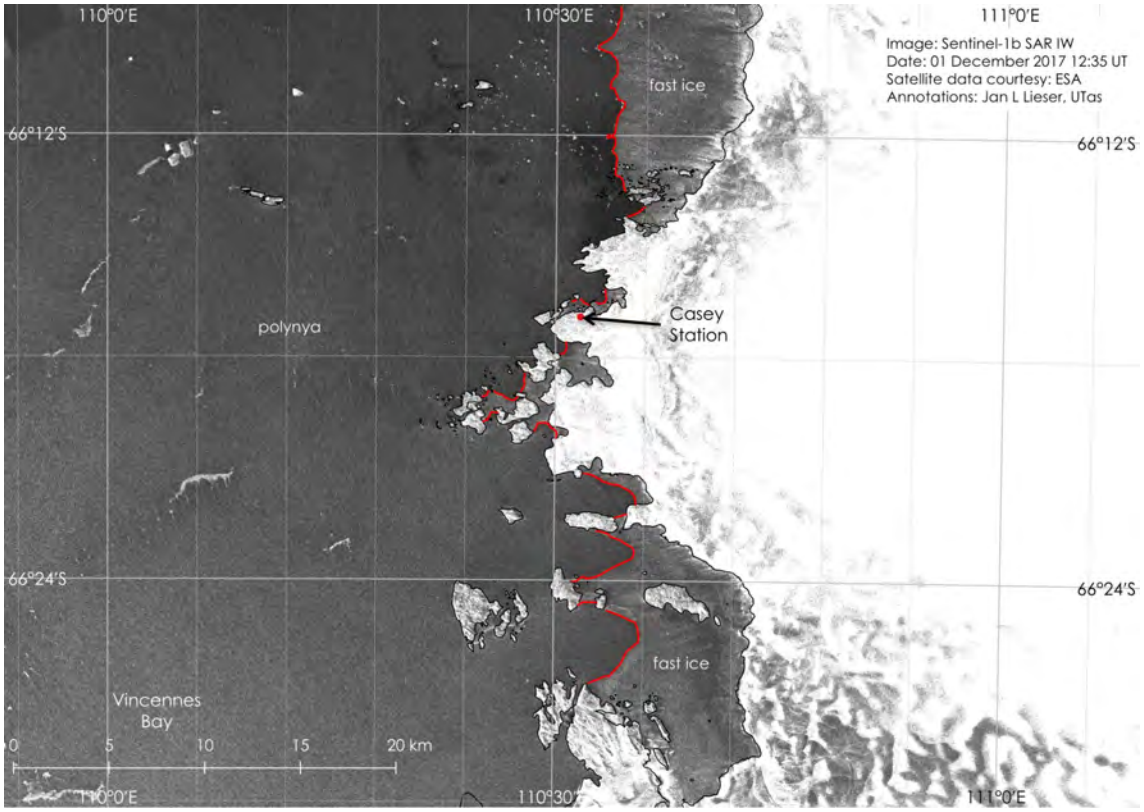

Figure 2: Sentinel-1b SAR IW acquired 01/12/2017 at 12:35 UT and provided by PolarView.

Sea Ice Report #50.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

06/12/2017

Ross Sea

Figure 1 shows a sea-ice concentration chart for the Ross Sea with an overlay of two SAR scenes.

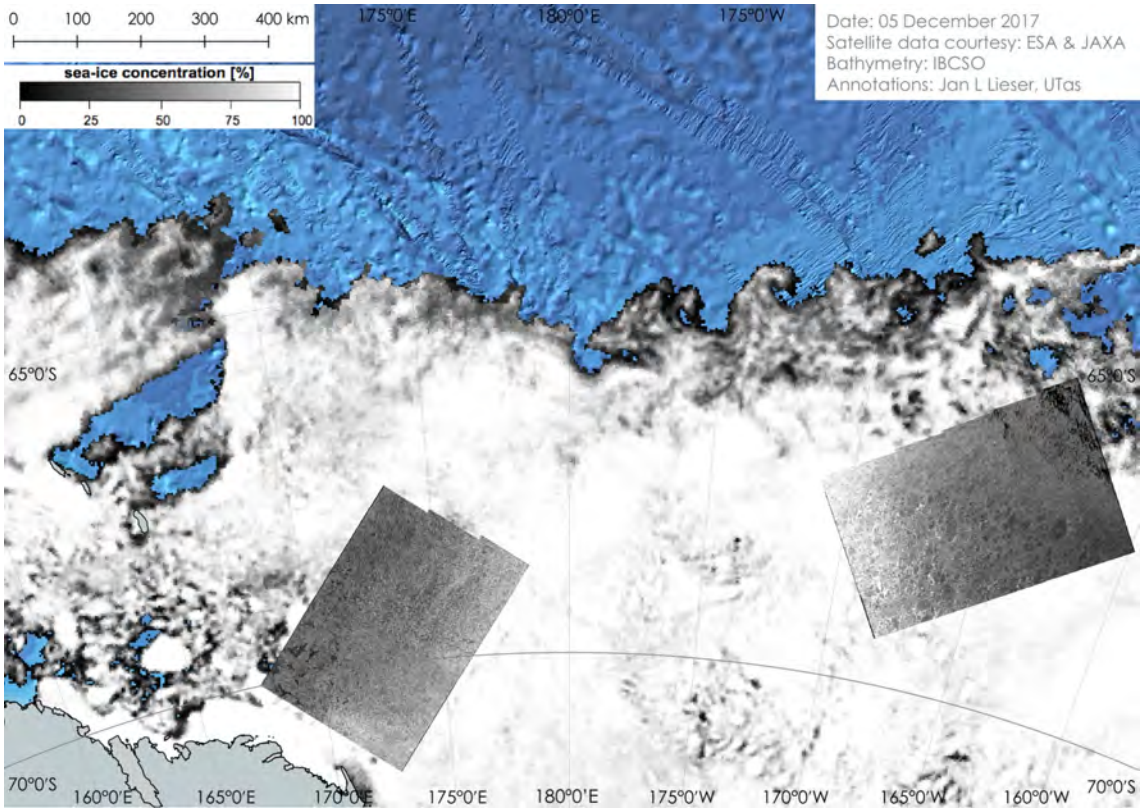

Figure 1: AMSR-2 sea-ice concentration for 05/12/2017 provided by Universität Hamburg and Sentinel-1 SAR scenes acquired 05/12/2017 at 07:06 UT (eastern scene: Sentinel-1b SAR EW) and acquired 05/12/2017 at 16:00 UT (western scene: Sentinel-1a SAR IW), both SAR scenes provided by PolarView.

Northeast of the Balleny Islands, the northern polynya is separated from the open water only by a small patch of low sea-ice concentration (less than 50% along 169° E; see Figure 2 for illustration).

East of 180° E, the marginal ice zone appears fuzzy and reaches locally as far south as 66° 15' S.

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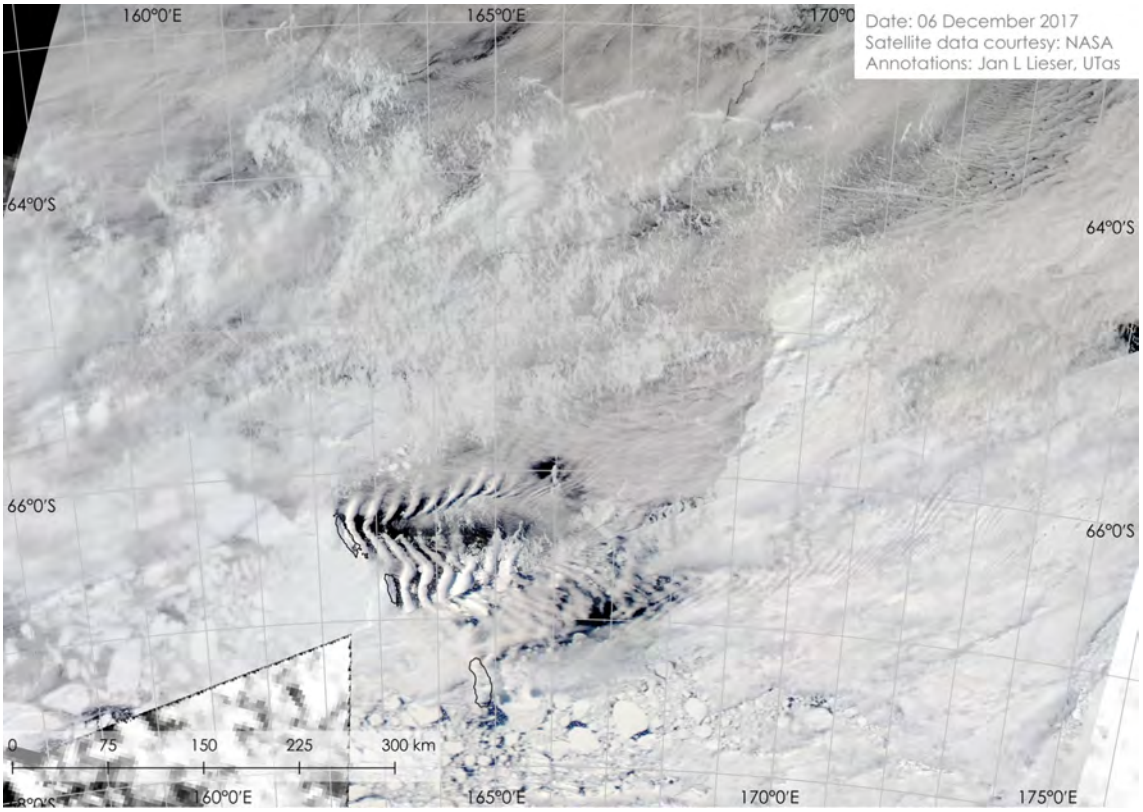

Figure 2: AQUA MODIS VIS scene acquired 06/12/2017 and provided by NASA, complemented by AMSR-2 data (see Figure 1).

Sea Ice Report #50.4/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

07/12/2017

Casey Station

Figure 1 shows a SAR scene offshore Casey Station on a background of visible data of the wider vicinity.

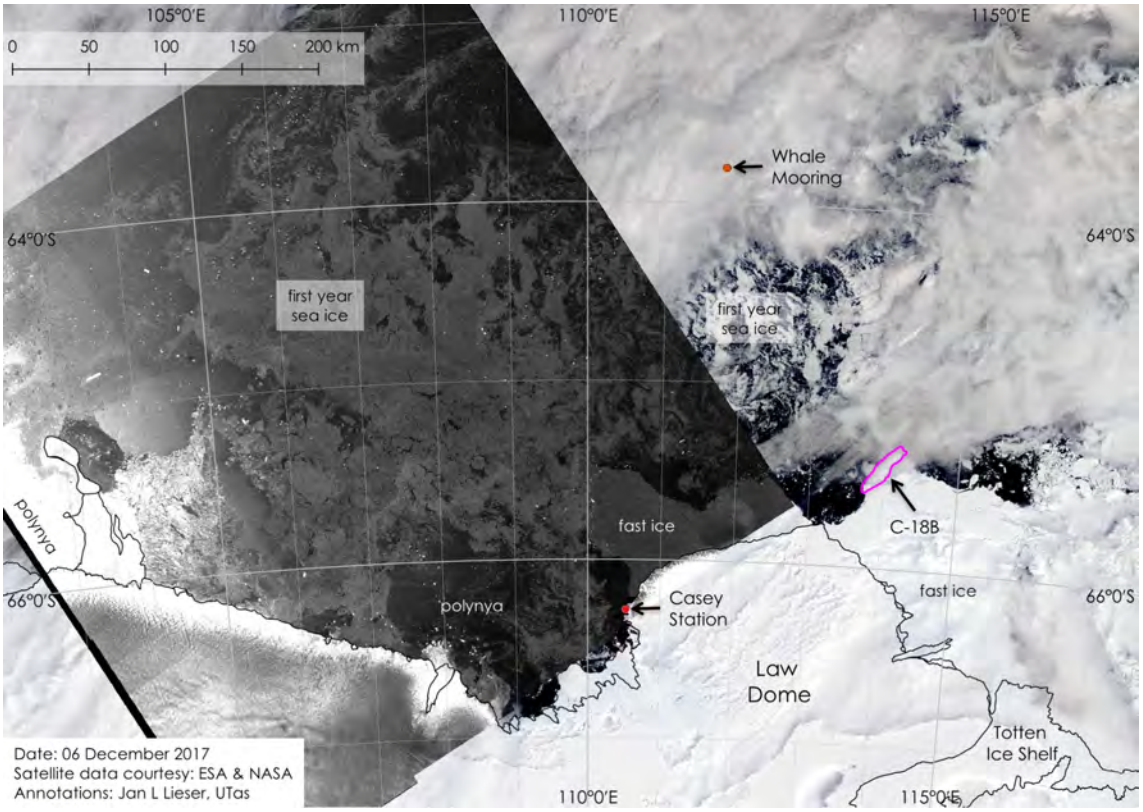

Figure 1: Sentinel-1b SAR EW acquired 06/12/2017 at 12:44 UT and provided by PolarView; background AQUA MODIS VIS scene acquired 06/12/2017 and provided by NASA.

Northwest of Law Dome, the pack ice is largely loose and dispersing. A large number of freely drifting icebergs can be seen in the SAR scene. West of Law Dome, some open pack ice is circling in Vincennes Bay. Off Casey Station, some shore-fast sea ice remains.

The location of a whale mooring is also covered by loose and open first-year pack ice.

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Sea Ice Report #50.5/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

08/12/2017

Ross Sea

Figure 1 shows a sea-ice concentration chart for the Ross Sea with an overlay of SAR scenes. The yellow line marks the December median sea-ice extent.

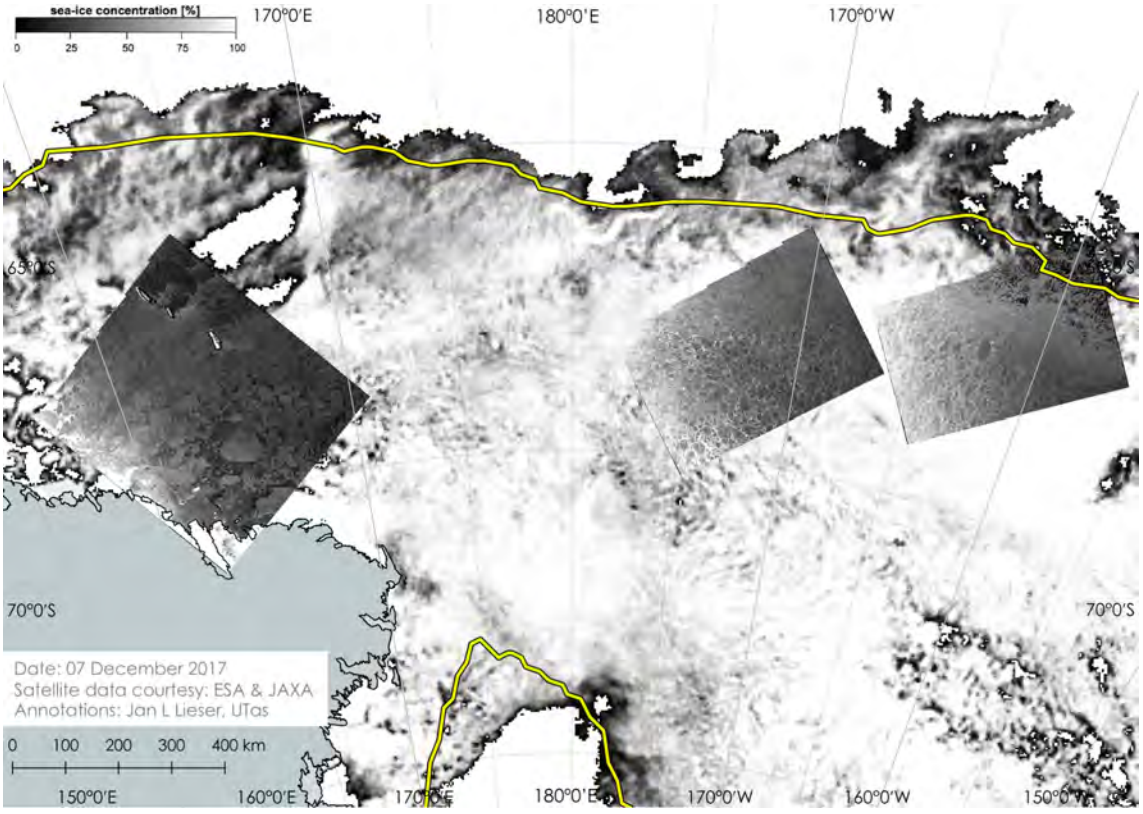

Figure 1: AMSR-2 sea-ice concentration for 07/12/2017 provided by Universität Hamburg and Sentinel-1 SAR scenes acquired 07/12/2017 at 06:49 UT (eastern scene: Sentinel-1b SAR EW), acquired 07/12/2017 at 07:39 UT (central scene: Sentinel-1a SAR EW) and acquired 07/12/2017 at 09:18 UT (western scene: Sentinel-1a SAR EW), SAR scenes provided by PolarView.

The current sea-ice extent has almost reached the December median already. South of the Balleny Islands, vast sea-ice floes are drifting northeastward with some open water around them. East of 170° E, the pack ice appears closed with high and very high concentration. Very large sea-ice floes are embedded in the pack ice mix.

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Sea Ice Report #50.6/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

08/12/2017

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea. Dashed, pink lines mark the positions of large tabular icebergs on 30/11/2017 (see Sea Ice Report #49.4/2017).

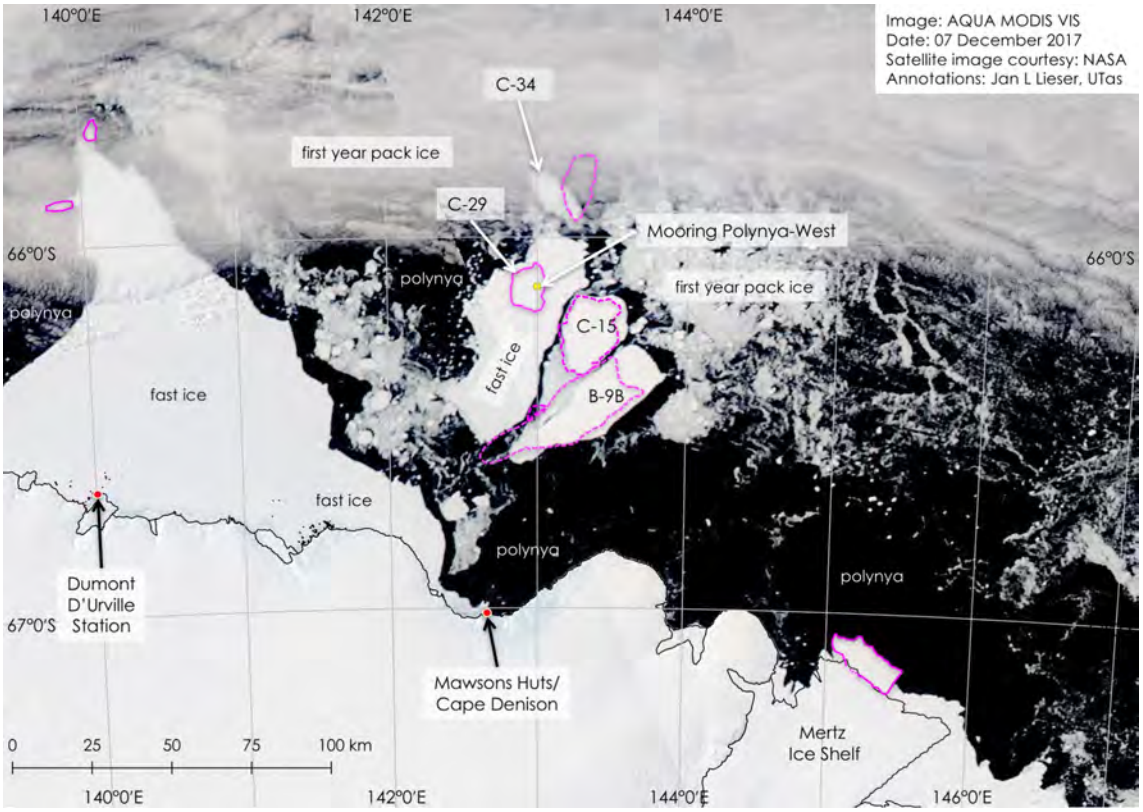

Figure 1: AQUA MODIS VIS scene acquired 07/12/2017 and provided by NASA.

Off Cape Denison, fast ice continues to break up and the coast east of the cape is now entirely free of fast ice towards the Mertz Ice Shelf.

Since 30/11/2017, iceberg B-9B has travelled roughly 8 km northeastward, while iceberg C-15 moved as little as 1 km northward. Iceberg C-34 rotated about 50 degrees anti-clockwise.

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Sea Ice Report #51.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

12/12/2017

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for November 2017.

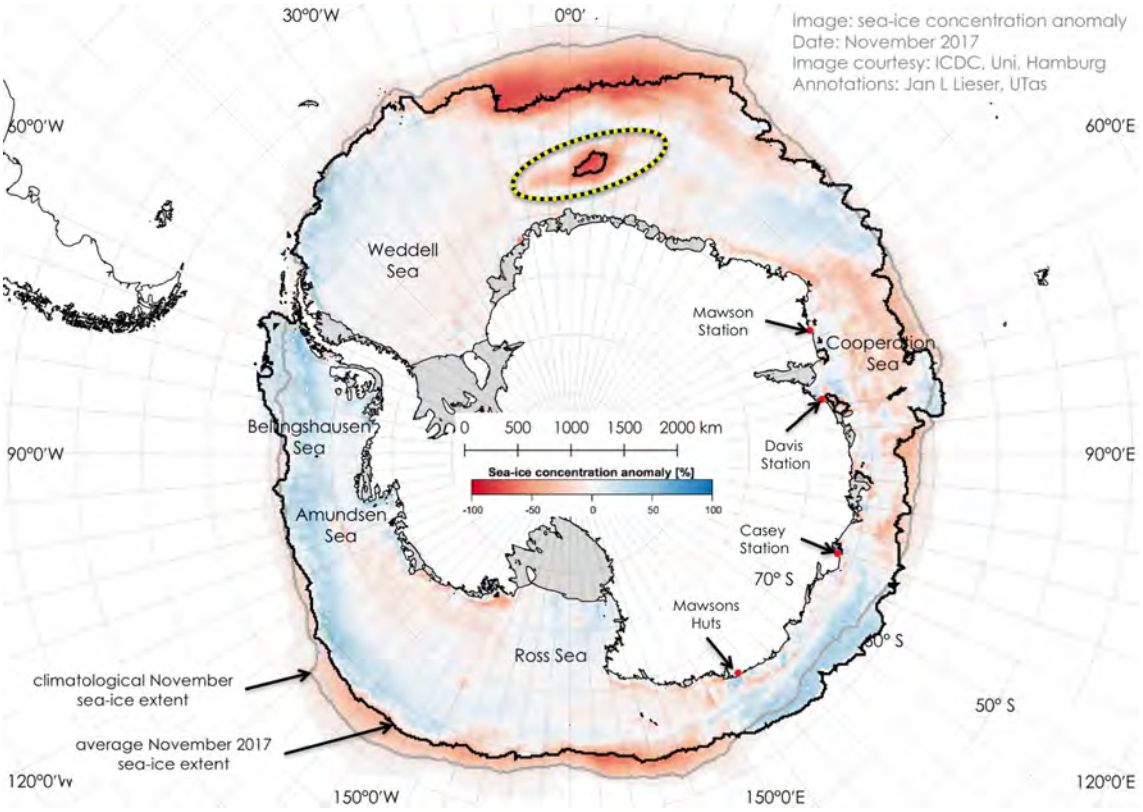

Figure 1: Sea-ice concentration anomaly for November 2017 provided by ICDC, Universität Hamburg.

The general trend of anomalous sea-ice concentration around Antarctica continued through November 2017. Stand-out features are the low sea-ice extent in the eastern Weddell Sea and the Maud Rise polynya (black-yellow ellipse in Figure 1). But Ross Sea and Cooperation Sea also show lower than average sea-ice concentration and extent.

November 2017 averages of sea-ice extent and area are second only to last year's record low figures, which is also true for the global (Arctic and Antarctic) sea-ice extent.

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Casey Station

Figure 2 shows a SAR and visible data composite off Law Dome.

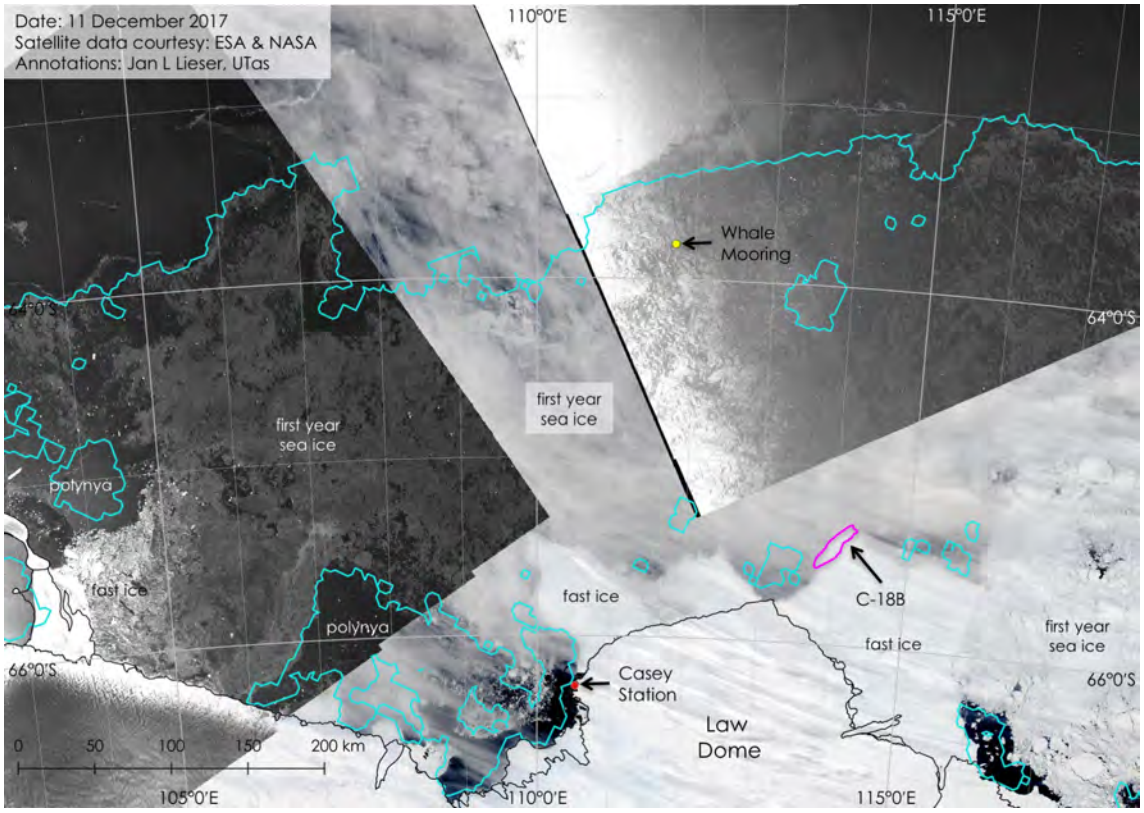

Figure 2: Composite of visible and SAR imagery plus sea-ice edge (blue contour). Visible data AQUA MODIS acquired 11/12/2017 and provided by NASA; eastern SAR scene Sentinel-1a SAR EW acquired 11/12/2017 at 12:04 UT and western SAR scene Sentinel-1b SAR EW acquired 11/12/2017 at 12:52 UT, both SAR scenes provided by PolarView; Sea-ice edge contour based on sea-ice concentration data provided by ICDC, Universität Hanburg.

The position of a whale mooring is given by the yellow dot and currently covered by only loose pack ice of the marginal ice zone. East of the mooring, many icebergs can be seen drifting with the marginal sea ice.

Between 106° E and 110° E, the sea-ice edge is close to the monthly average extent of December (not shown in Figure 2).

Off the northwestern flank of Law Dome, fast ice continues to break up and only little fast ice remains in sheltered, near-shore areas in the immediate vicinity of Casey Station (see Figure 3).

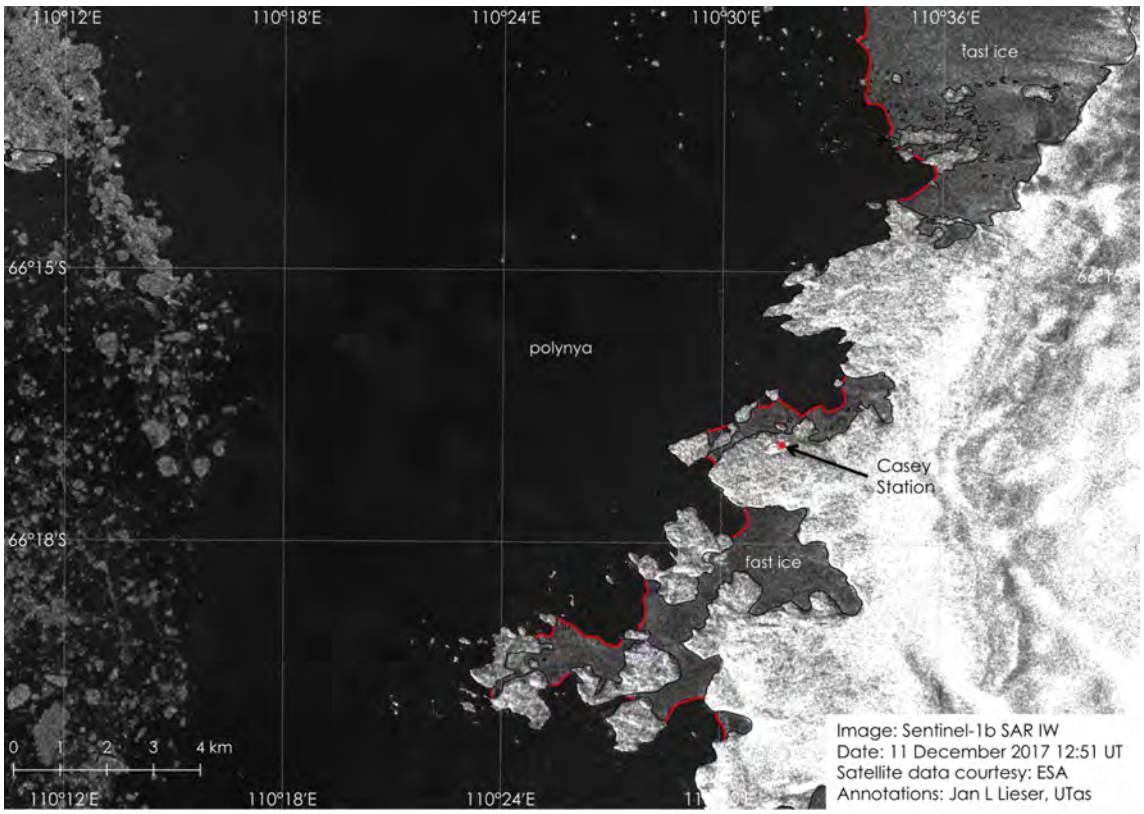

Figure 3: Sentinel-1b SAR IW scene acquired 11/12/2017 at 12:51 UT and provided by PolarView.

Sea Ice Report #52.1/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

18/12/2017

Casey Station

Figure 1 shows a sea-ice concentration chart off Law Dome.

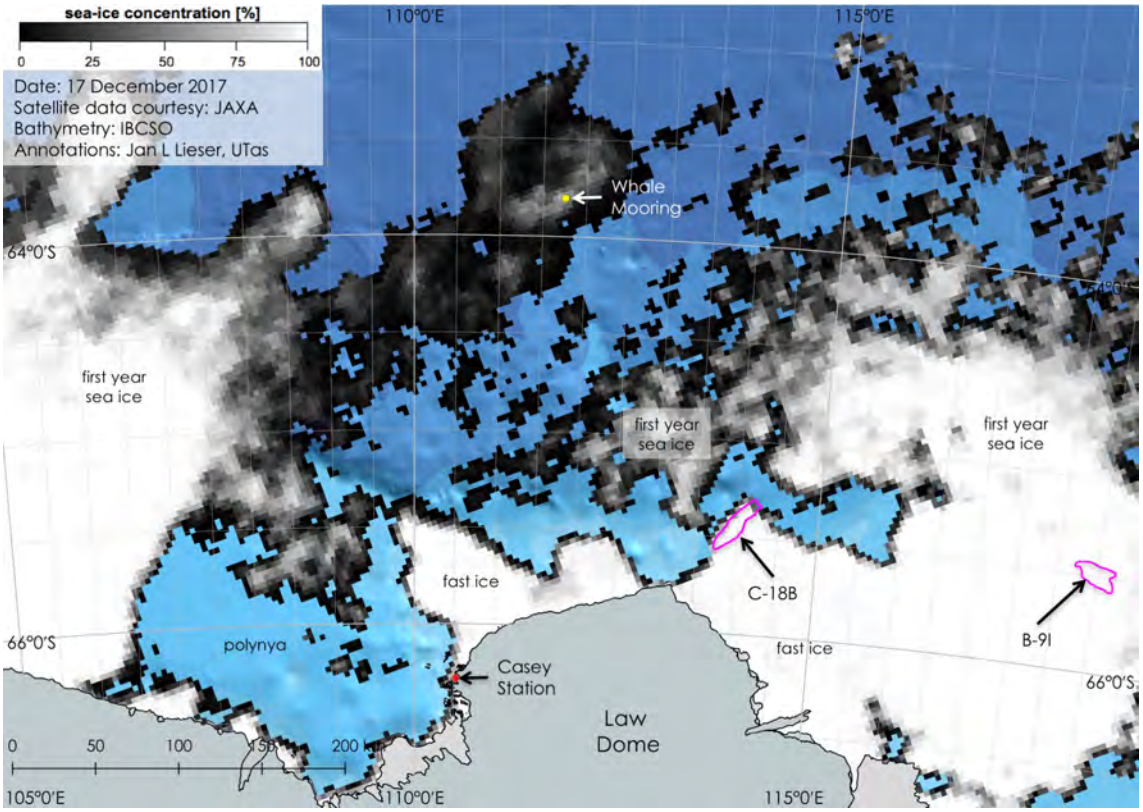

Figure 1: Sea-ice concentration data acquired 17/12/2017 and provided by ICDC, Universität Hanburg.

The position of a whale mooring is given by the yellow dot and currently covered by only loose pack ice of the marginal ice zone.

A corridor of open water is currently running from roughly 109° 30' E and 65° 25' S northeastward and the polynya of Vincennes Bay is separated from the open ocean only by low-concentration sea ice.

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Sea Ice Report #52.2/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

19/12/2017

Mawson Station

Figure 1 shows a visible scene of Mawson Coast.

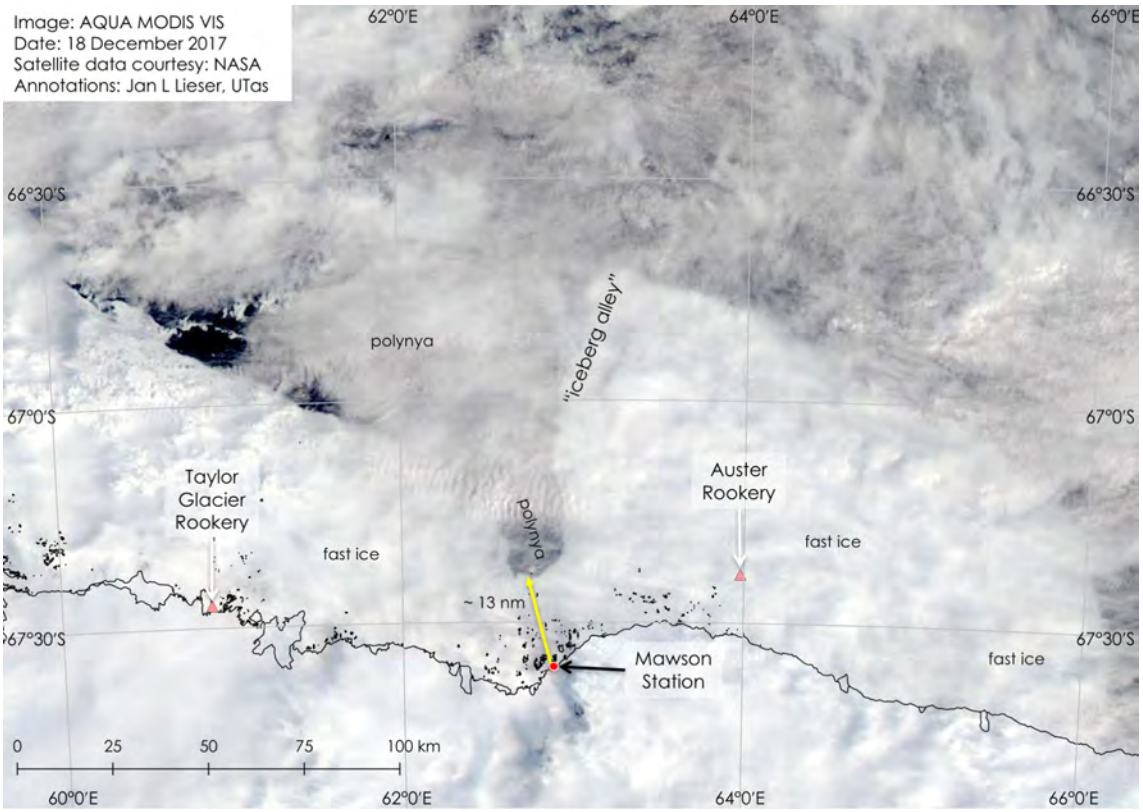

Figure 1: AQUA MODIS VIS scene acquired 18/12/2017 and provided by NASA.

Offshore Mawson Station, fast ice is breaking up. The shortest distance from the station to the polynya in the north is now less than 13 nautical miles (yellow arrow). Fast ice around "iceberg alley" is also breaking up.

Casey Station

Figure 2 shows a high-resolution SAR scene of Casey Station.

In the vicinity of the station, some near-shore fast ice remains in sheltered bays.

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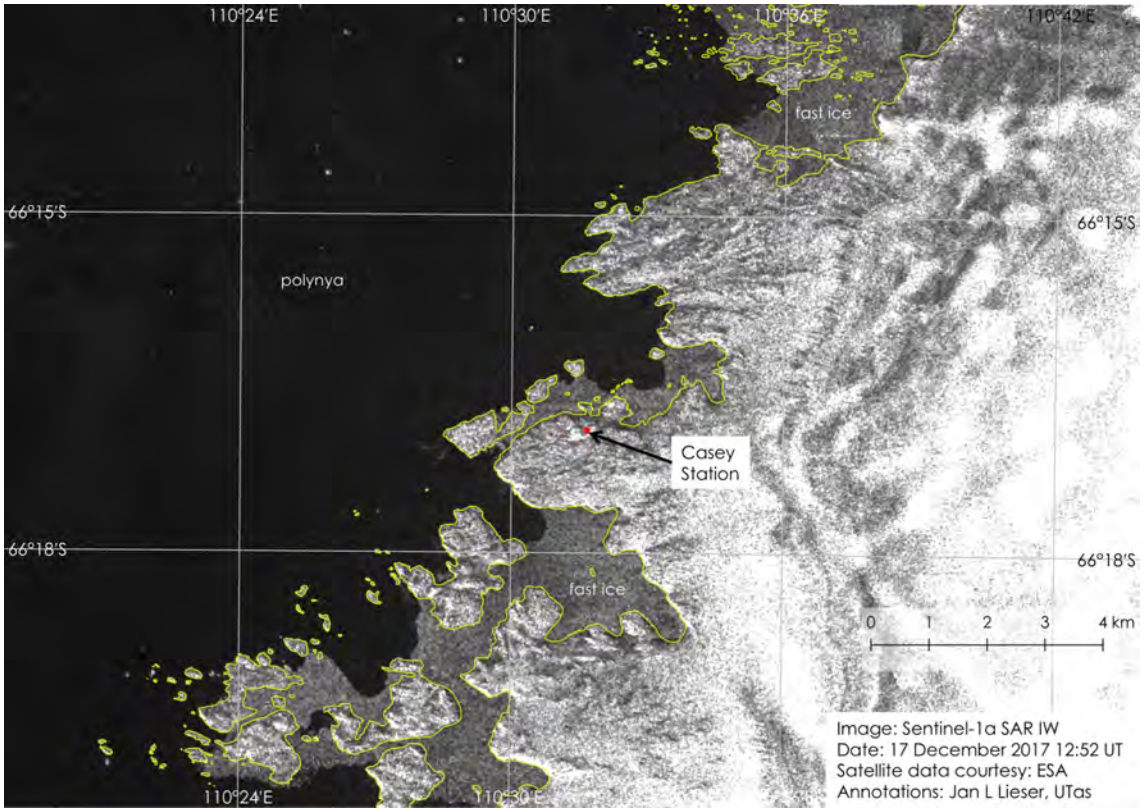

Figure 2: Sentinel-1a SAR IW acquired 17/12/2017 at 12:52 UT and provided by PolarView.

Sea Ice Report #52.3/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

20/12/2017

Casey Station

Figure 1 shows a very high-resolution (15 m spatial) visible scene of Casey Station.

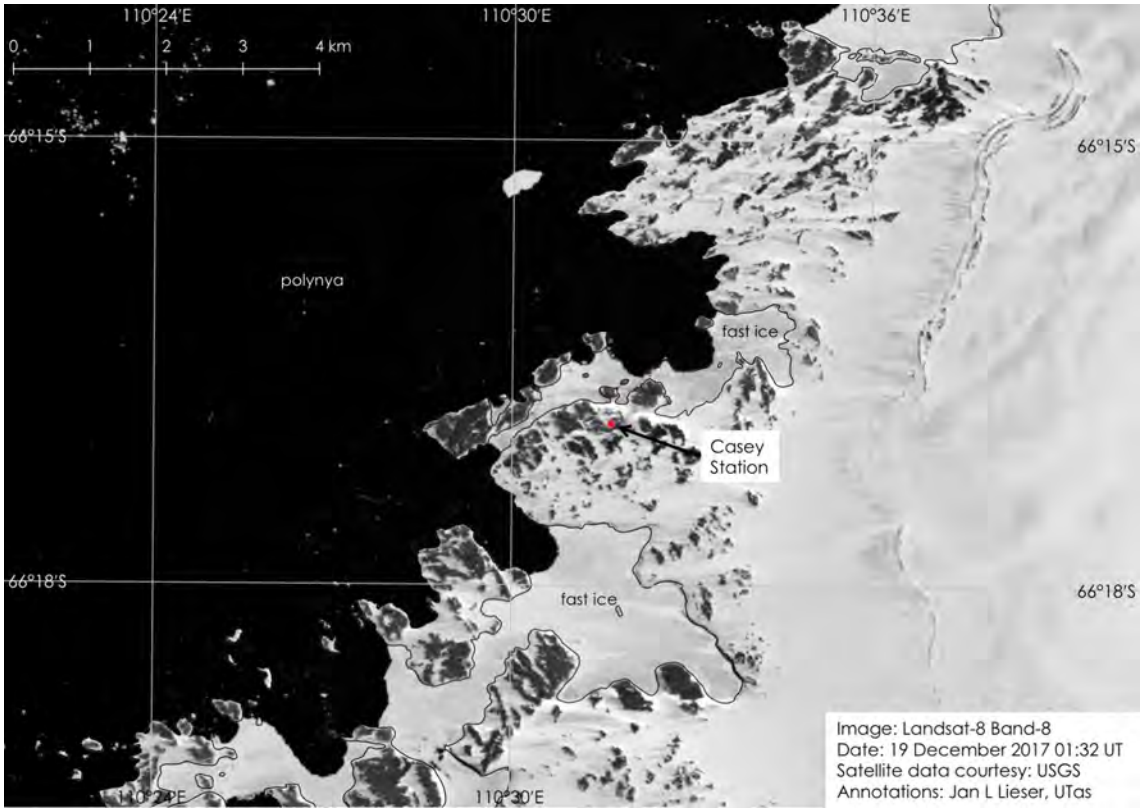

Figure 1: Landsat-8 panchromatic (Band-8) scene acquired 19/12/2017 at 12:52 UT and provided by USGS.

In the vicinity of the station, some near-shore fast ice remains in sheltered bays.

Figure 2 shows a sea-ice concentration chart off Law Dome. The cruise track of RSV *Aurora Australis* is given by the orange line (up until 20/12/2017 01:00 UT). The position of a whale mooring is given by the yellow dot; the position is surrounded by only very low sea-ice concentration.

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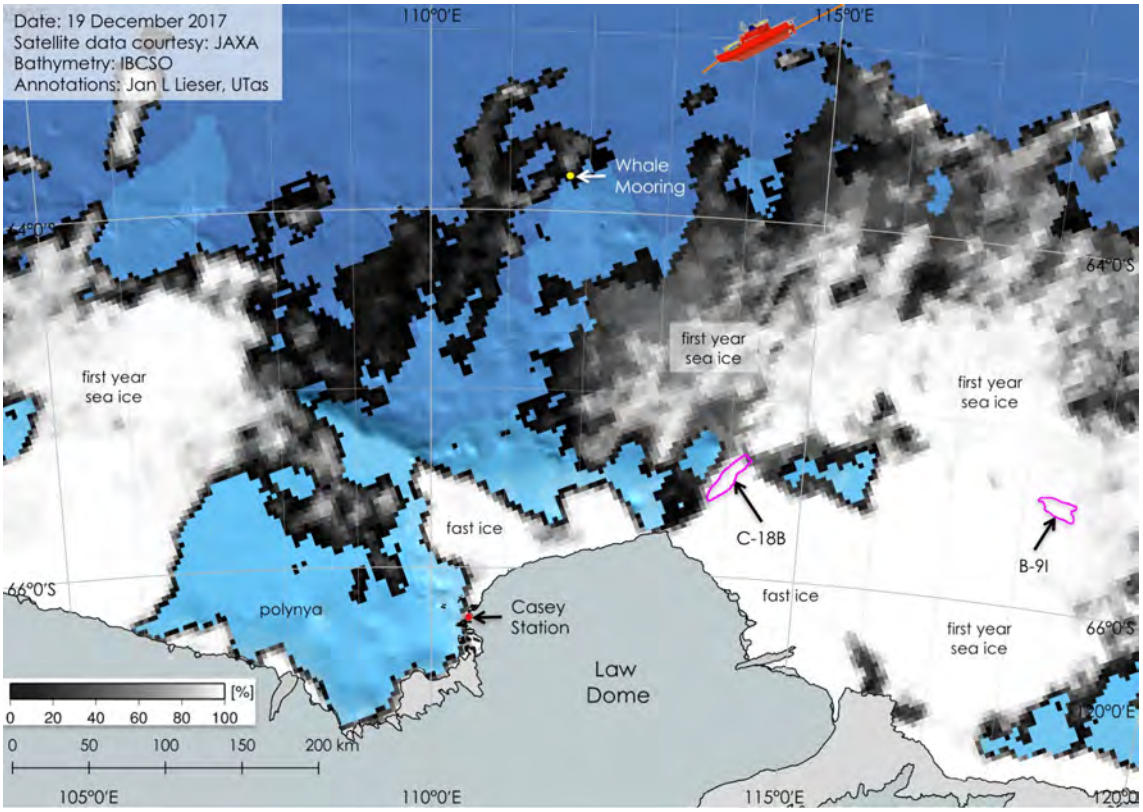

Figure 2: Sea-ice concentration chart acquired 19/12/2017 and provided by ICDC, Universität Hamburg.

Sea Ice Report #52.4/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

21/12/2017

Mawson Station

Figure 1 shows a visible scene of Mawson Coast.

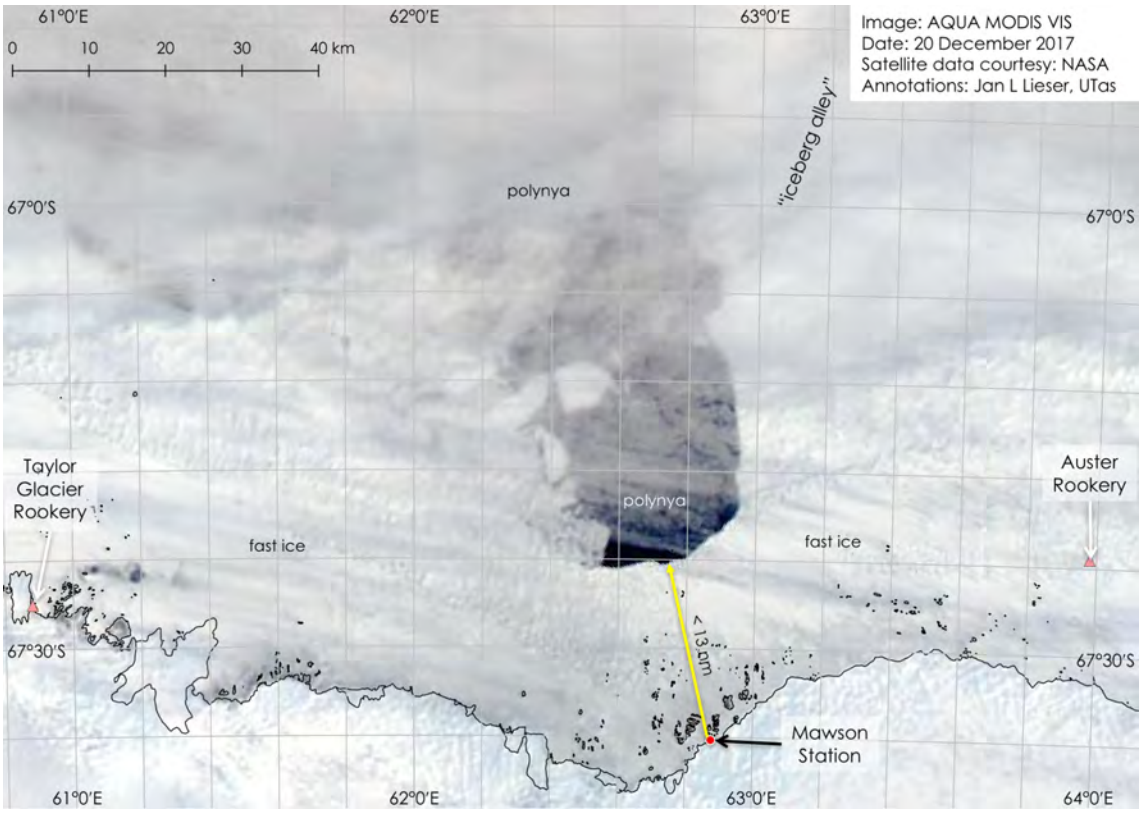

Figure 1: AQUA MODIS VIS scene acquired 20/12/2017 and provided by NASA.

North of Mawson Station, the fast-ice edge can be clearly determined and is less than 13 nautical miles offshore. Further east (not shown in the figure), fast ice is breaking off the coast and the fast-ice edge is creeping along the shoreline.

Davis Station

Figure 2 shows a high-resolution SAR scene complemented by visible data of the ocean north of Prydz Bay.

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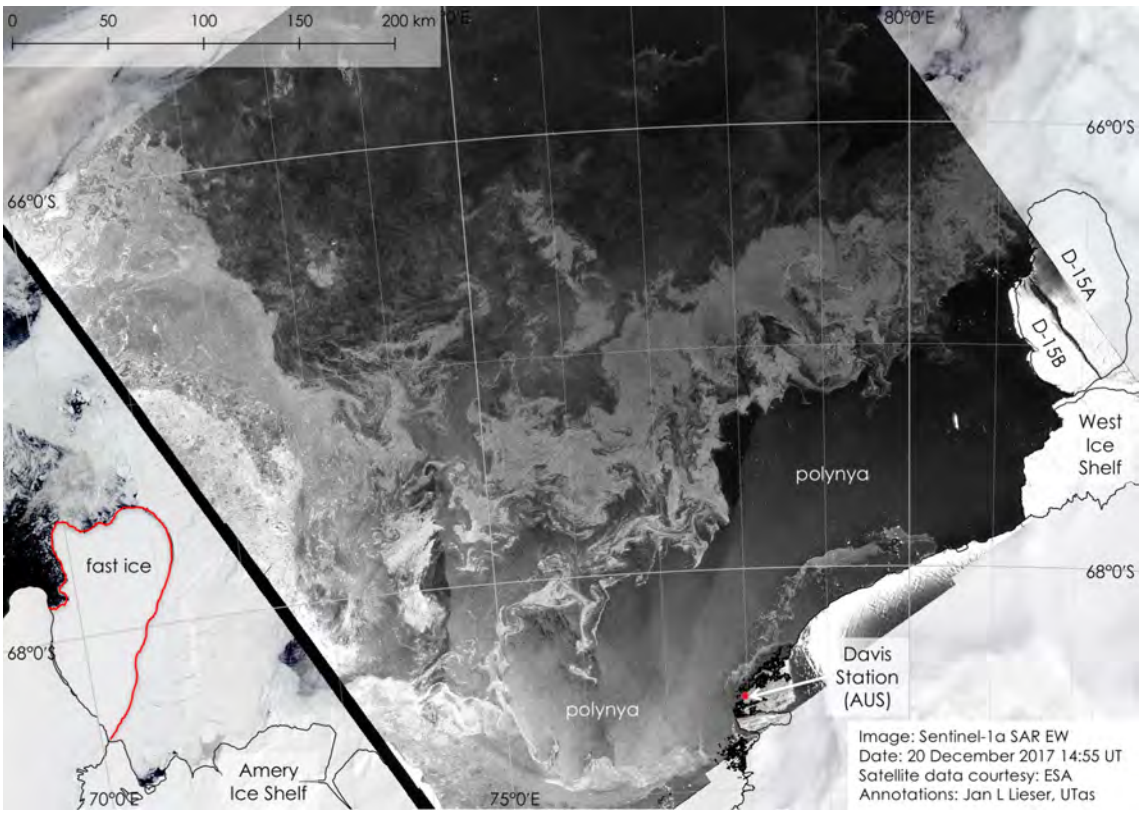

Figure 2: Sentinel-1a SAR EW scene acquired 20/12/2017 at 14:55 UT and provided by PolarView; complemented by AQUA MODIS VIS scene acquired 20/12/2017 and provided by NASA.

North of Davis Station, fast ice is disintegrating along the coast towards the West Ice Shelf. The southeastern part of Cooperation Sea is filled with only small floes of melting first-year sea ice. Some fast ice remains north of the Amery Ice Shelf and high concentration of sea ice accumulates against the fast ice there before being pushed far enough northward, where it disperses and melts.

Casey Station

Figure 3 shows a composite of a high-resolution SAR swath and visible data off Law Dome. A yellow dot marks the position of a whale mooring. The cruise track of RSV *Aurora Australis* is given by the orange line (up until 21/12/2017 02:00 UT).

West of the whale mooring, patches of melting sea ice are drifting freely and are easily pushed around by wind and waves.

A large polynya is the prominent feature of Vincennes Bay southwest of Casey Station. Further west (not shown in the figure), large regions of open water are also found east and west of the Shackleton Ice Shelf.

East of Law Dome, areas of open water can be seen off the face of Totten Ice Shelf, where the shelf spawns new icebergs northward. North

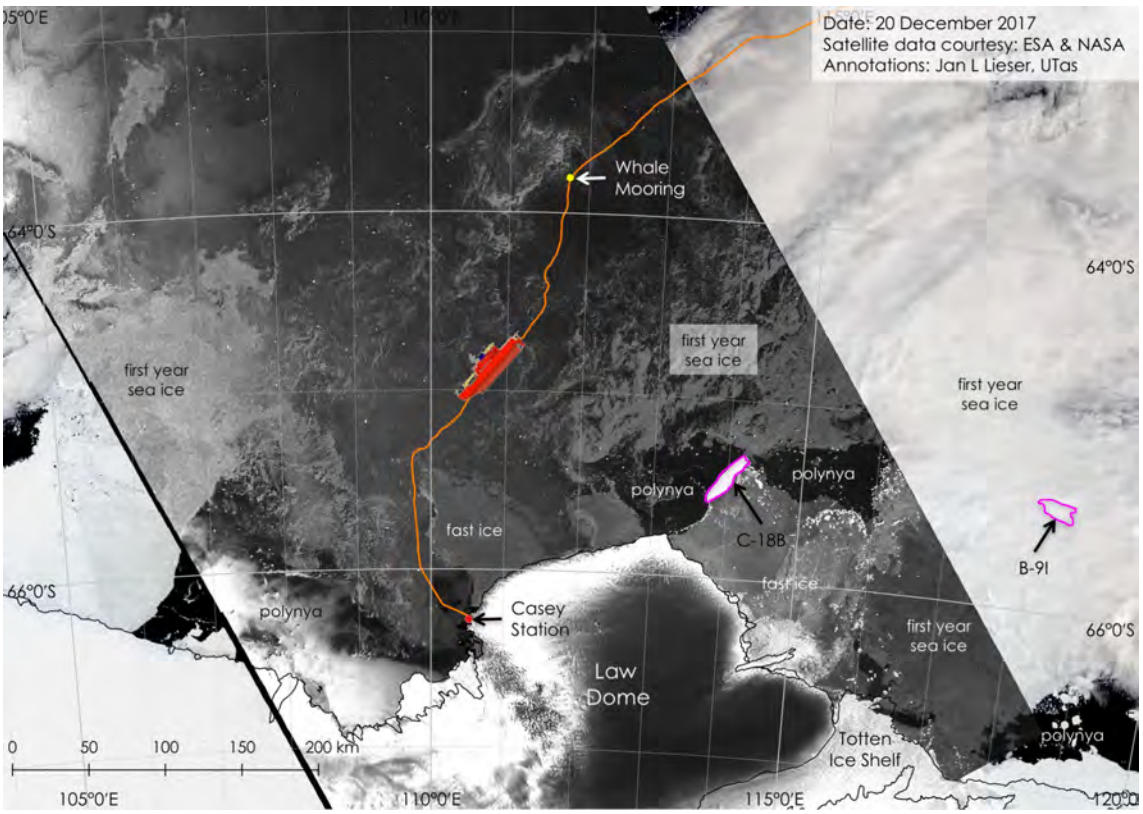

Figure 3: Sentinel-1b SAR EW scene acquired 20/12/2017 at 12:28 UT and provided by PolarView, complemented by AQUA MODIS VIS scene acquired 20/12/2017 and provided by NASA.

of the Moscow University Ice Shelf and west of the Dalton Iceberg Tongue (outside Figure 3), a large polynya remains present.

D'Urville Sea

Figure 4 shows a high-resolution SAR scene of southern D'Urville Sea complemented by visible data in the northeast.

Off Cape Denison, the entire bay is now free of fast ice. Even though the exact positions of four large, tabular icebergs are obscured by thin clouds of the visible scene, it can still be determined that fast ice around iceberg C-29 continues to break up.

Northwest of Dumont D'Urville Station, one large iceberg (western pink shape) that was enclosed by fast ice is now drifting freely in the polynya, while a second one is still attached to the large body of fast ice offshore.

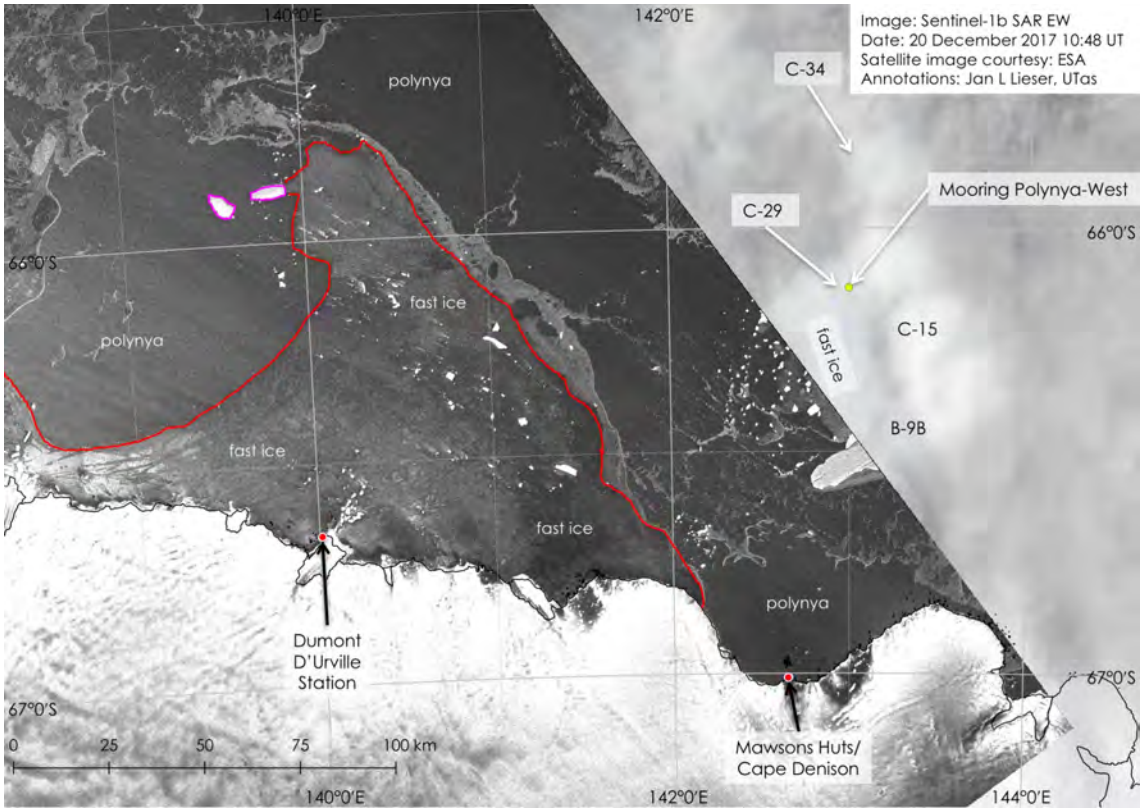

Figure 4: Sentinel-1b SAR EW scene acquired 20/12/2017 at 10:48 UT and provided by PolarView; complemented by AQUA MODIS VIS scene acquired 20/12/2017 and provided by NASA.

Sea Ice Report #52.5/2017

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

22/12/2017

Mawson Station

Figure 1 shows a high-resolution SAR scene offshore Mawson Station.

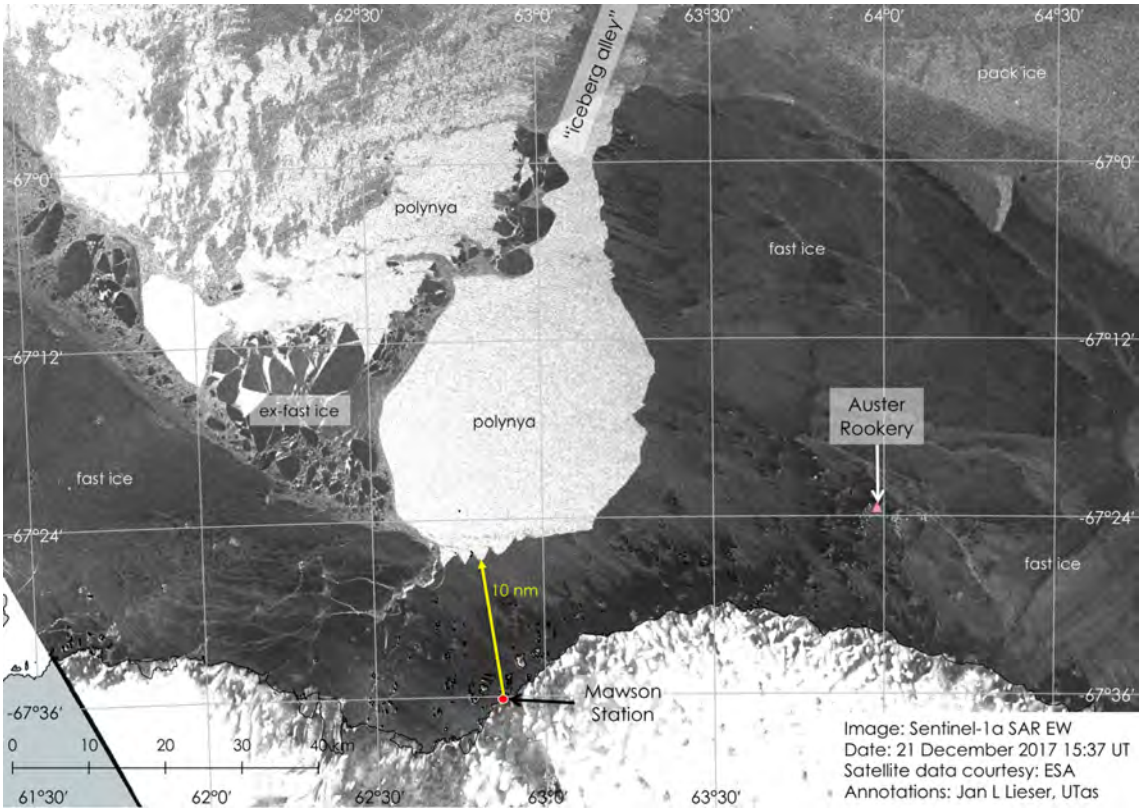

Figure 1: Sentinel-1a SAR EW scene acquired 21/12/2017 at 15:37 UT and provided by PolarView.

North of Mawson Station, the fast-ice edge can be clearly determined and the shortest distance to the sea is now 10 nautical miles. The high-resolution SAR also reveals the broken structures in the fast ice northwest of the station. Large cracks are emerging in the fast ice and are propagating towards the shore southwestward; they are evident as white tracks in the otherwise dark appearance of the fast ice.

"Iceberg alley" appears largely free of fast ice but some broken and melting ice remains local.

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Sea Ice Report #01.1/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

02/01/2018

Mawson Station

Figure 1 shows a sea-ice concentration chart off Mawson Coast.

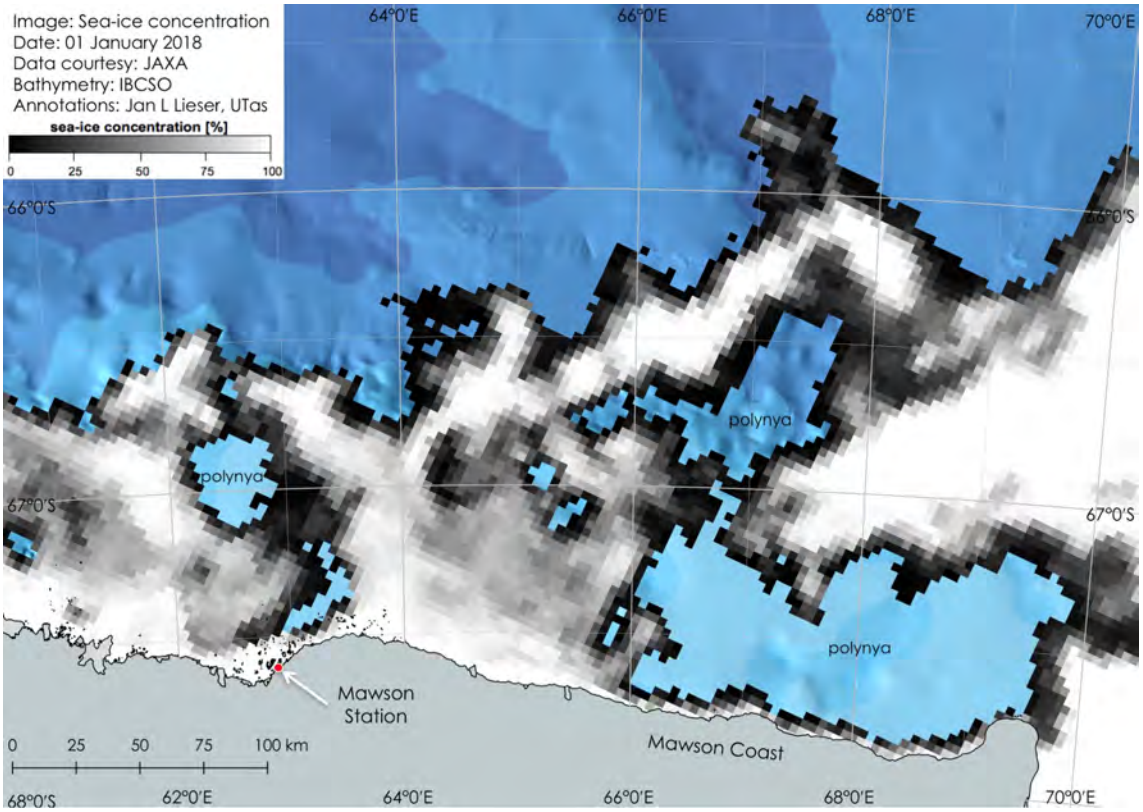

Figure 1: Sea-ice concentration data acquired 01/01/2018 and provided by Universtität Hamburg.

The sea-ice is retreating southward quickly in the region. East and west of Mawson Station, there is still some fast ice attached to the shore and between 60° E and 66° E, the pack ice north of the fast ice consists predominantly of ex-fast ice with inclusions of first-year sea ice.

Figure 2 shows a high-resolution (15 m spatial) visible scene offshore Mawson Station. North of the station, the fast-ice edge can be clearly determined and the shortest distance to the polynya is now 4.3 nautical miles.

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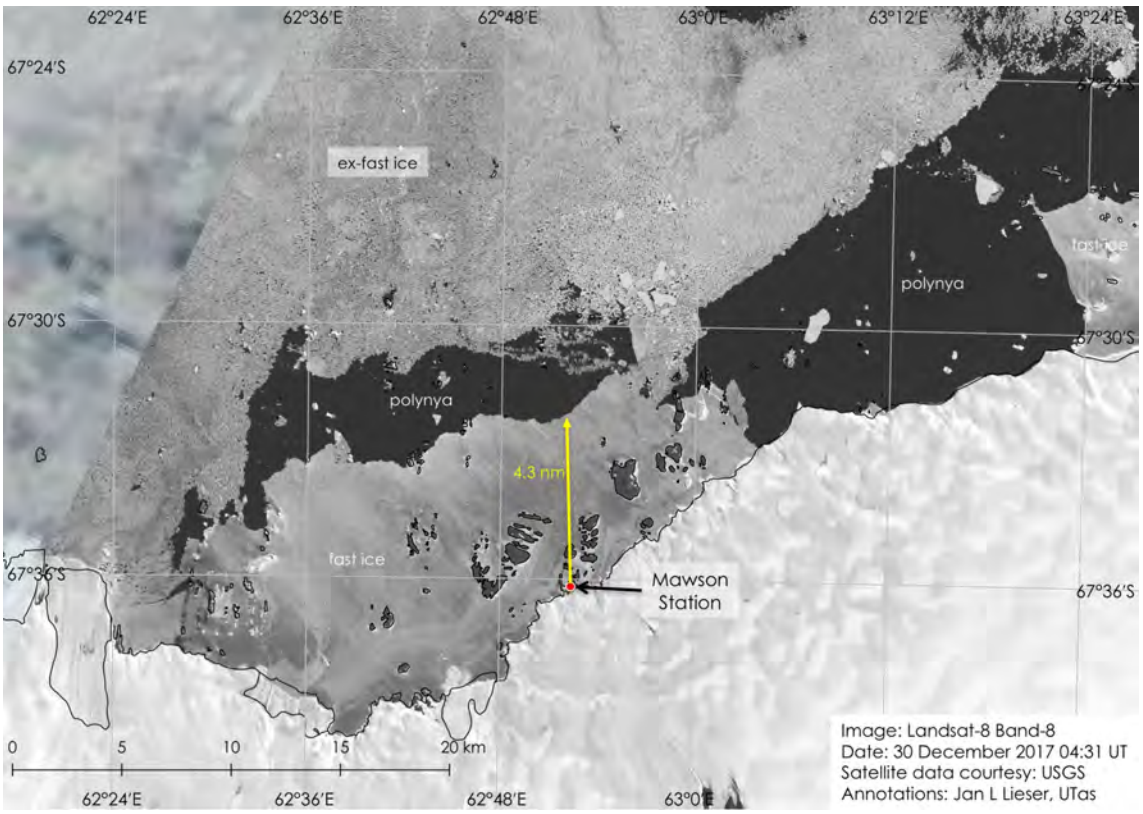

Figure 2: Landsat-8 panchromatic (Band-8) scene acquired 30/12/2017 at 04:31 UT and provided by USGS.

Casey Station

Figure 3 shows a visible scene of Law Dome and vicinity. The cruise track of RSV *Aurora Australis* is given by the orange line (up until 02/01/2018 00:30 UT) and large tabular icebergs are marked by pink shapes (dashed shape for B-9I on 01/01/2018; it travelled roughly 6.5 nautical miles since).

Between 106° E and 108° E, hardly any sea ice is left between the coast and the open ocean and west of 110° E, off the fast ice north of Casey Station, the small floes of ice are largely melting ex-fast ice. East of the same body of fast ice, newly broken-off fast ice can be seen drifting in large floes.

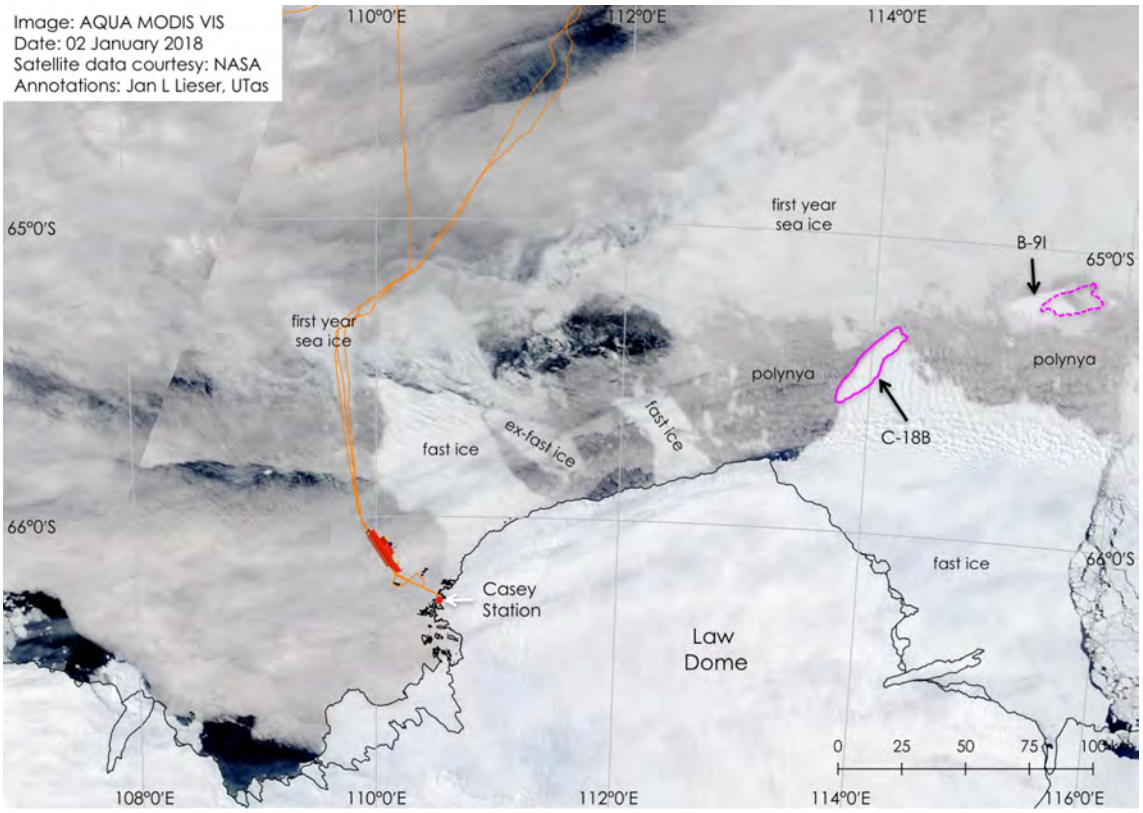

Figure 3: AQUA MODIS VIS data acquired 02/01/2018 and provided by NASA.

Sea Ice Report #01.2/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

03/01/2018

Mawson Station

Figure 1 shows a visible scene of Mawson Coast.

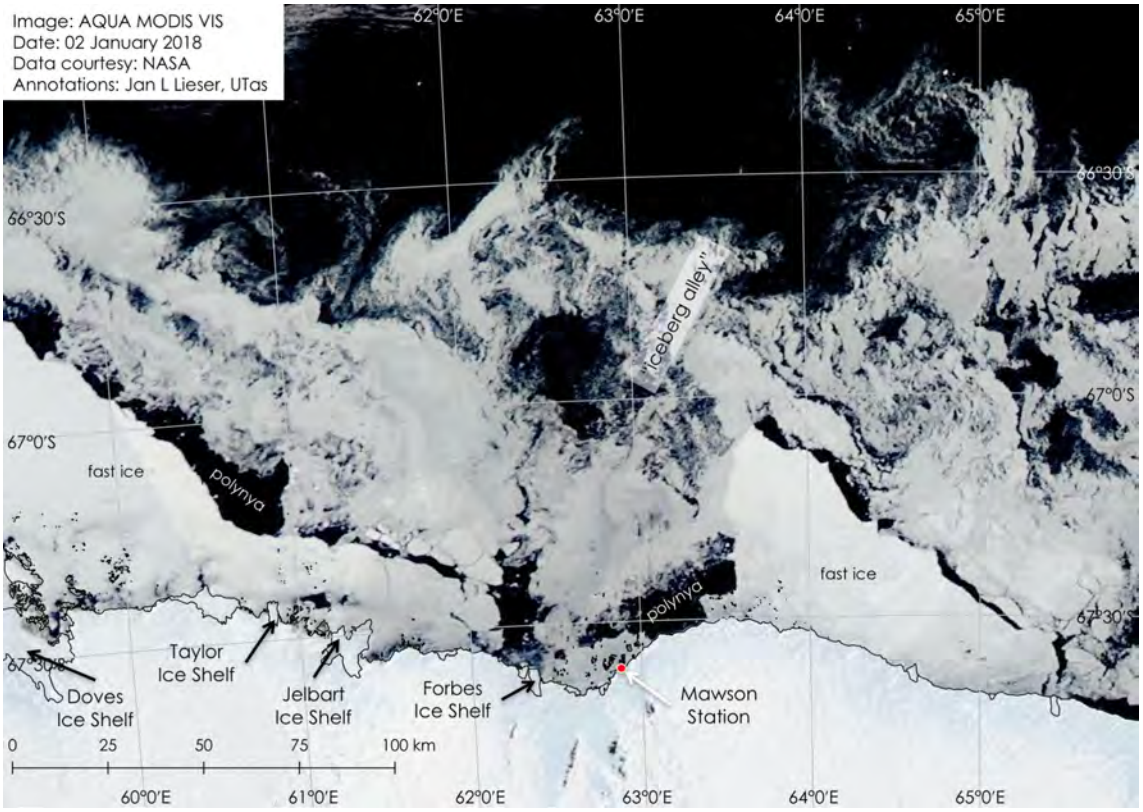

Figure 1: AQUA MODIS VIS data acquired 02/01/2018 and provided by NASA.

Further to Sea Ice Report #01.1/2018, the extent of fast ice break up is obvious. Between the Taylor and Jelbart ice shelves, fast ice is melting through near the shore before the rest will will break off eventually; the same is true north of Doves Ice Shelf. East of Mawson Station, the body of fast ice is also reducing in extent.

Offshore pack ice consists mostly of a melange of first-year sea ice and melting ex-fast ice.

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Sea Ice Report #01.3/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

04/01/2018

Casey Station

Figure 1 shows a SAR scene of Law Dome on a background of visible data of the wider vicinity.

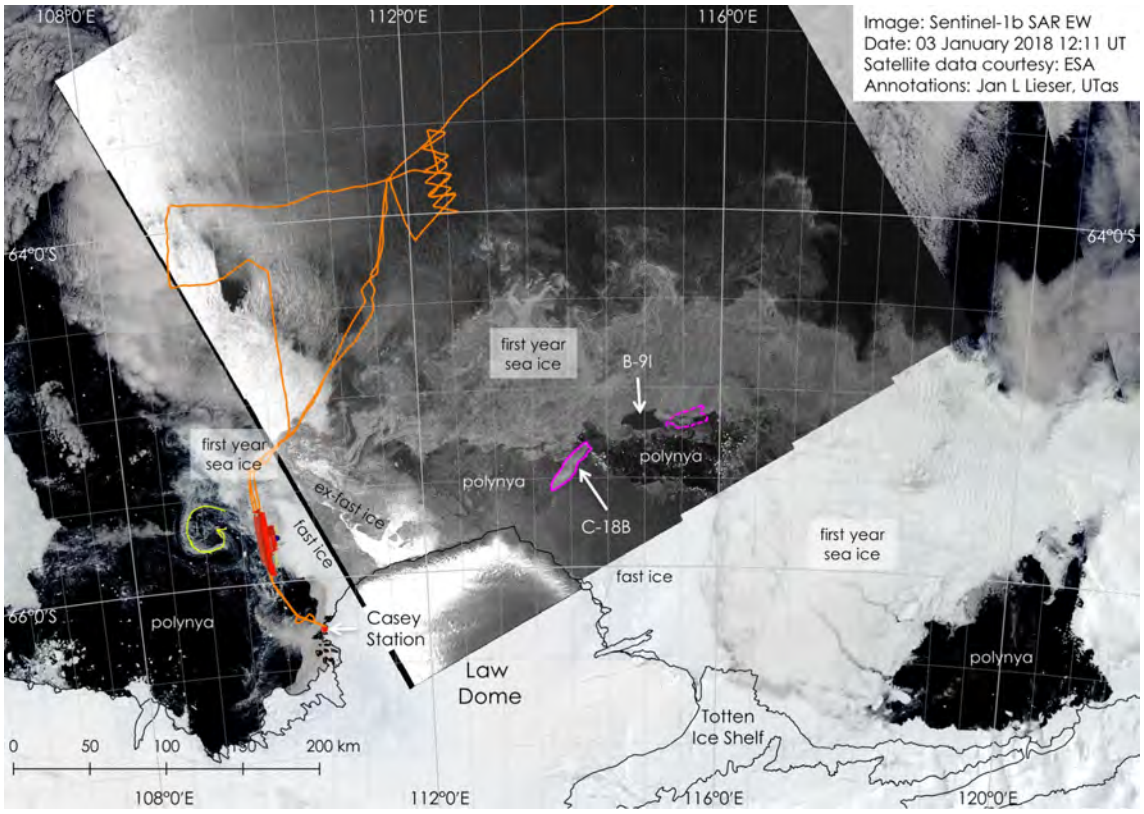

Figure 1: Sentinel-1b SAR EW data acquired 03/01/2018 at 12:11 UT and provided by PolarView; background: AQUA MODIS VIS data acquired 03/01/2018 and provided by NASA.

The sea-ice zone is largely confined to below 64° S, but some patches of sea ice can still be found north of it. Also, many icebergs are drifting freely north of 64° S and are detectable as white spots in the SAR scene. Off the northwestern flank of Law Dome, fast ice continues to break up and ex-fast ice floes join the westward stream of first-year sea ice.
West of 110° E, some small-scale oceanic surface eddies are visible in sea-ice drift patterns (as indicated by the yellow arrow in the Figure).
Since 01/01/2018, iceberg B-9I has drifted roughly 30 km westward.

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D'Urville Sea

Figure 2 shows a visible-SAR composite of D'Urville Sea and its shoreline. The black-yellow line marks the sea-ice edge (15% sea-ice concentration) based on sea-ice concentration data from 03/01/2018.

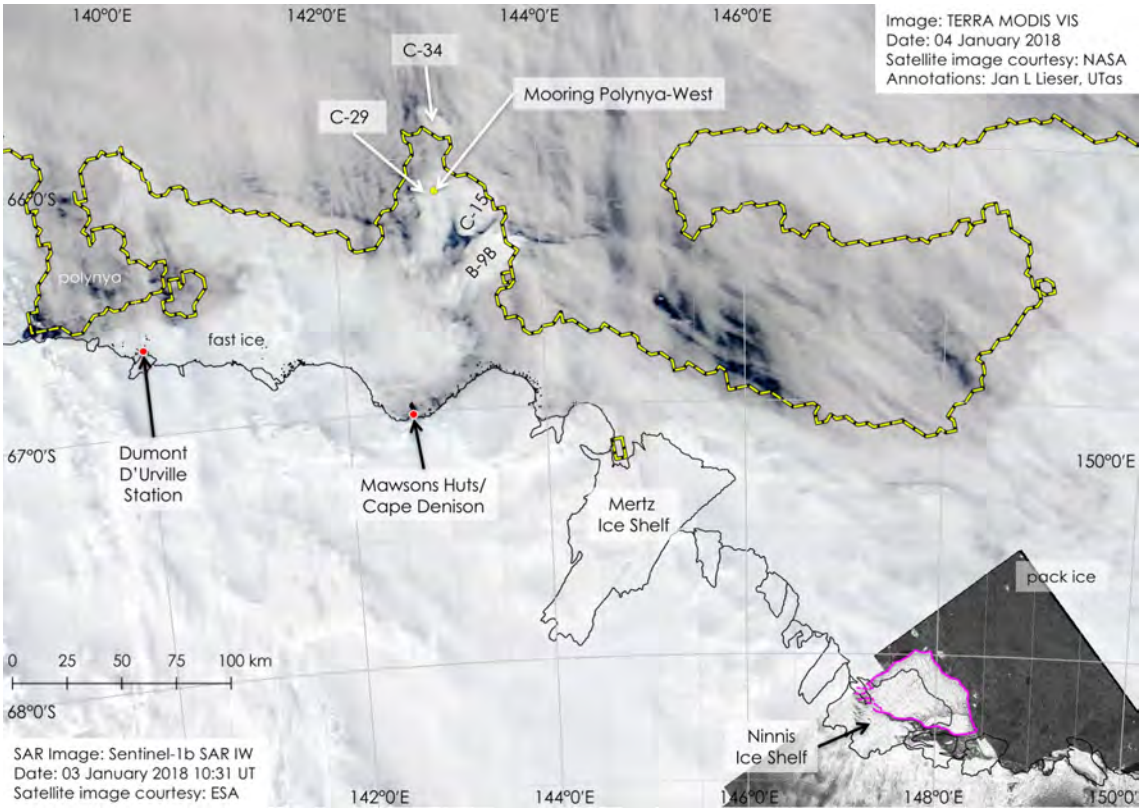

Figure 2: TERRA MODIS VIS data acquired 04/01/2018 and provided by NASA; Sentinel-1b SAR IW data acquired 03/01/2018 at 10:31 UT and provided by PolarView.

Even though the sea surface is obscured by clouds in the visible data, the presence of sea ice and the rough positions of four large, tabular icebergs north of Cape Denison/Commonwealth Bay can be seen. The slight mismatch between the sea-ice edge (black-yellow line) and the present sea ice is explained by the time difference between the data acquisitions and the different spatial resolution of the sensors. But the sea-ice edge indicates how far south the sea ice is confined in the region. Very low sea-ice concentration remains off Cape Denison with a mix of melting ex-fast ice and first-year pack ice offshore.

In the southeastern corner of Figure 2, the SAR scene shows that the front of the Ninnis Ice Shelf appears ripe to spawn a large iceberg (in the order 1100 km^2). Buttressed pack ice offshore and attached old fast ice east and west of the shelf could still stabilise it, but a number of cracks are evident at the western side of the shelf, the last semi-connected bit of the shelf and probably only a few (3 to 4) kilometres of a potential circumference of the new berg of approximately 155 km.

Sea Ice Report #01.4/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

05/01/2018

Casey Station

Figure 1 shows a high-resolution SAR scene of Casey Station. The buildings of the station can be seen as bright spots (red circle) and the position and orientation of RSV *Aurora Australis* (VNAA) can be seen just offshore of the station (orange circle).

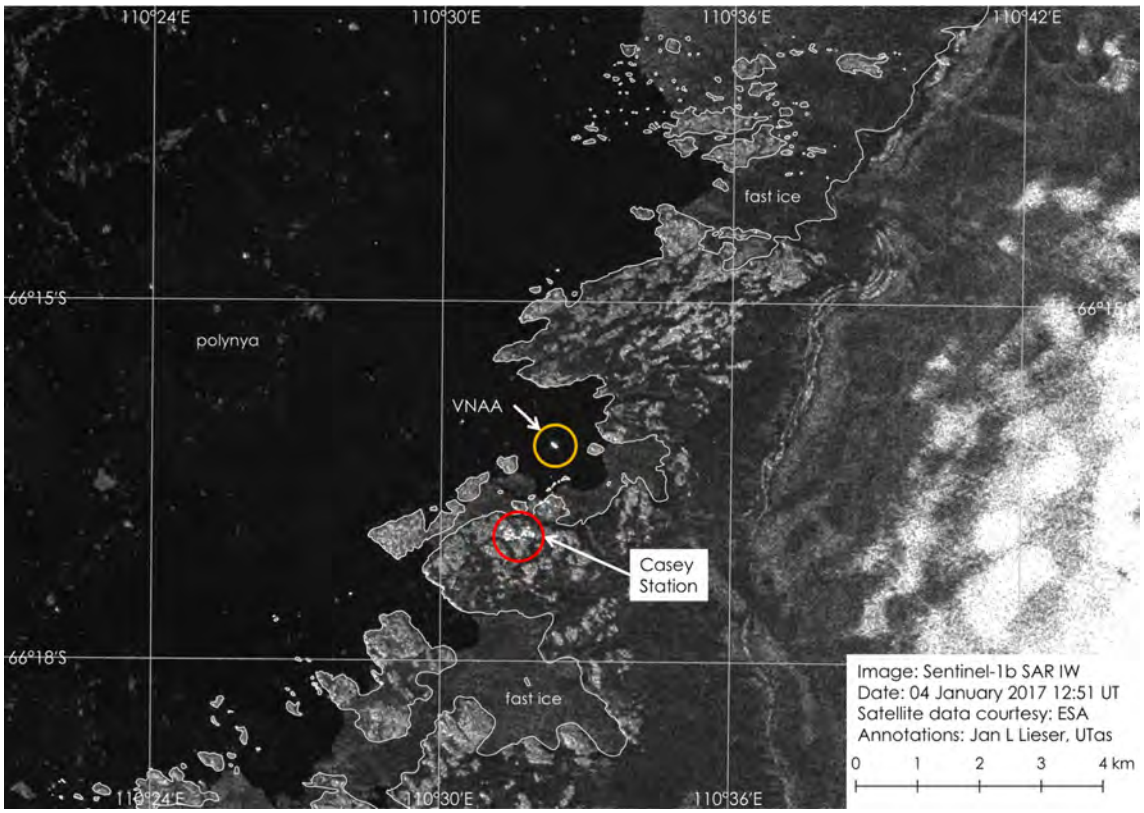

Figure 1: Sentinel-1b SAR IW data acquired 04/01/2018 at 12:51 UT and provided by PolarView.

Some fast ice remains nearshore in sheltered bays, but in general there is very little sea ice in the region. Drifting sea ice is decaying and melting. Off Law Dome, fast ice continues to break up and is drifting typically westward, mixing with melting first-year sea ice.

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Sea Ice Report #02.1/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

08/01/2018

Mawson Station

Figure 1 shows a visible scene of Mawson Coast.

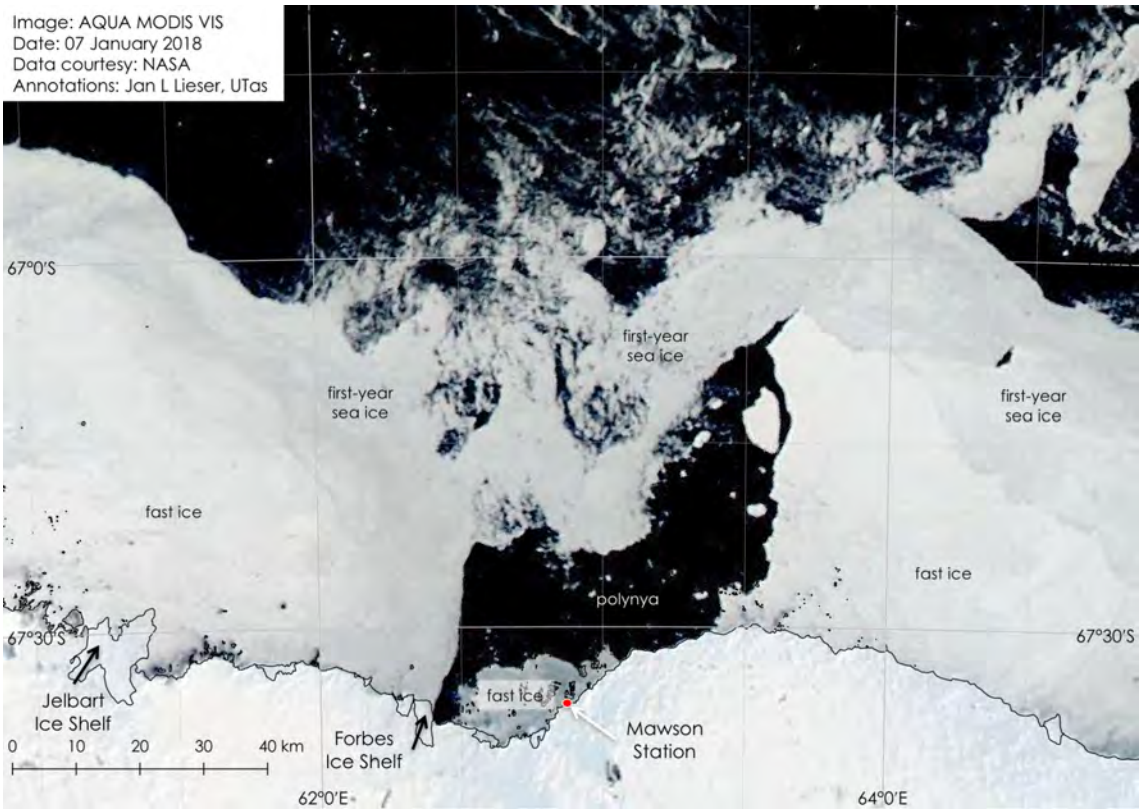

Figure 1: AQUA MODIS VIS acquired 07/01/2018 and provided by NASA.

Off Mawson Station, some fast ice remains nearshore between islands. The closest distance to open water is roughly 3 nautical miles north of the station, off Welch Island.

Sabrina Coast

Figure 2 shows a high-resolution SAR scene of Law Dome and vicinity. The position and orientation of iceberg B-9I on 04/01/2018 is indicated by the dashed, pink shape.

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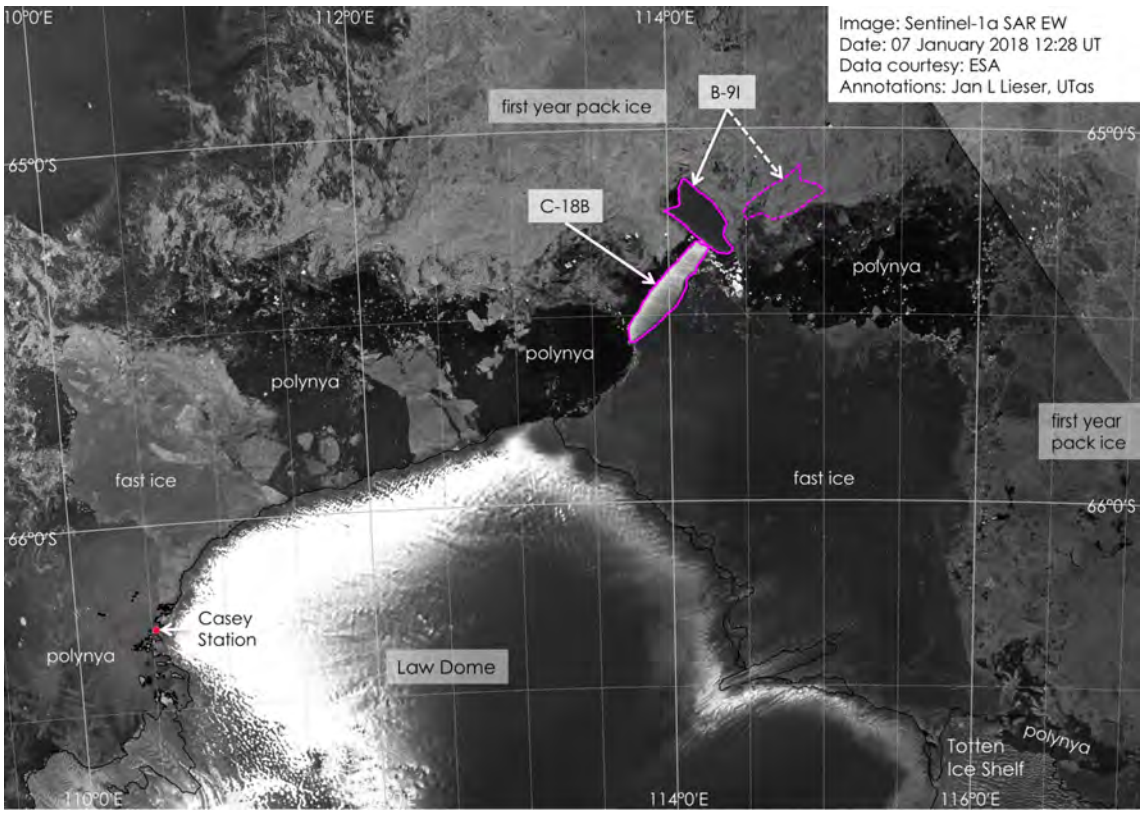

Figure 2: Sentinel-1a SAR EW data acquired 07/01/2018 at 12:28 UT and provided by PolarView.

Iceberg B-9I continues its drifting west in water depth of roughly 1000 m. Since 04/01/2018, the berg has bumped into the northern end of iceberg C-18B (of which only about a quarter – its northeastern end – sits in water depth greater than 500 m) and rotated approximately 100 degree. It is expected that iceberg B-9I will continue its westward drift eventually.

Sea Ice Report #02.2/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

08/01/2018

Wilkes Land

Figure 1 shows a sea-ice concentration chart off Wilkes Land. Proposed stations of Voyage-01/2018 of RV *Investigator* are indicated by light-blue dots.

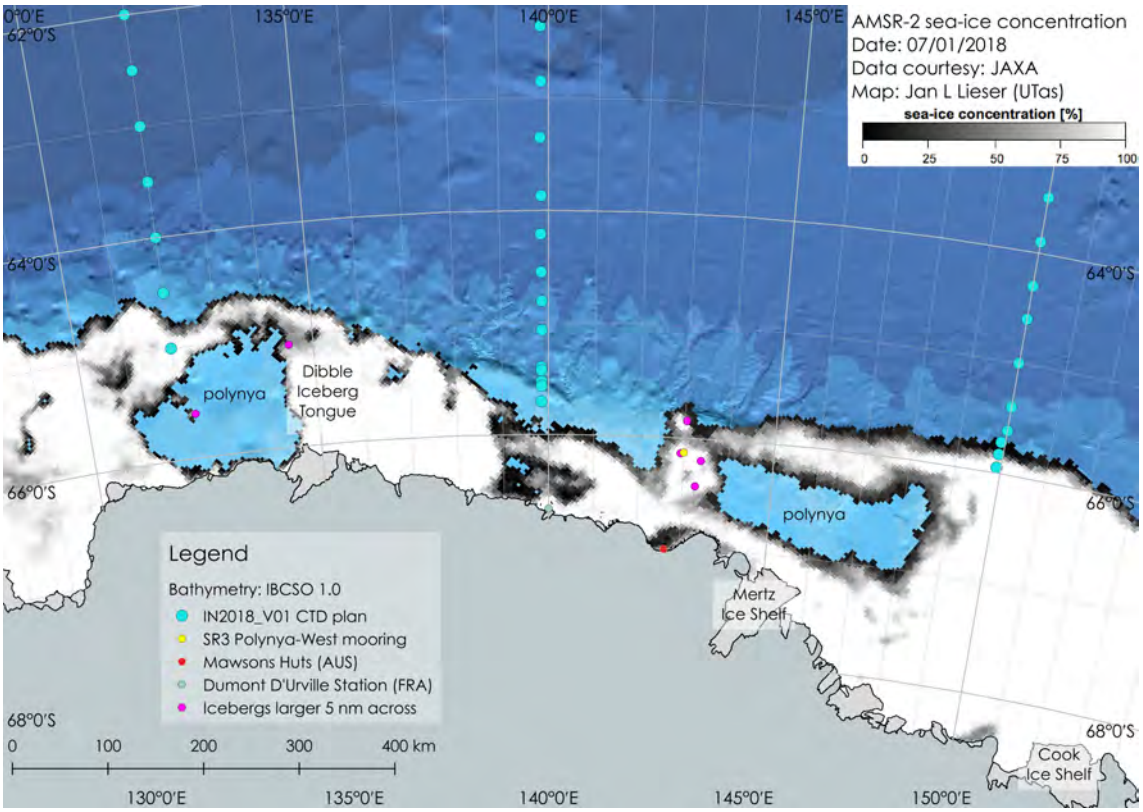

Figure 1: Sea-ice concentration chart acquired 07/01/2018 and provided by Universität Hamburg.

At this stage, only the southernmost stations along 133° E and 150° E are affected by the presence of sea ice, but some isolated sea-ice floes or iceberg fragments may also be expected at the southernmost stations along 140° E.
The location of an oceanographic mooring (SR-3 Polynya-West; yellow dot) remains occupied by a large, tabular iceberg, but fast ice surrounding this iceberg continues to break up and melt.

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Sea Ice Report #02.3/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

09/01/2018

Davis Station

Figure 1 shows a very high-resolution visible scene of Davis Station.

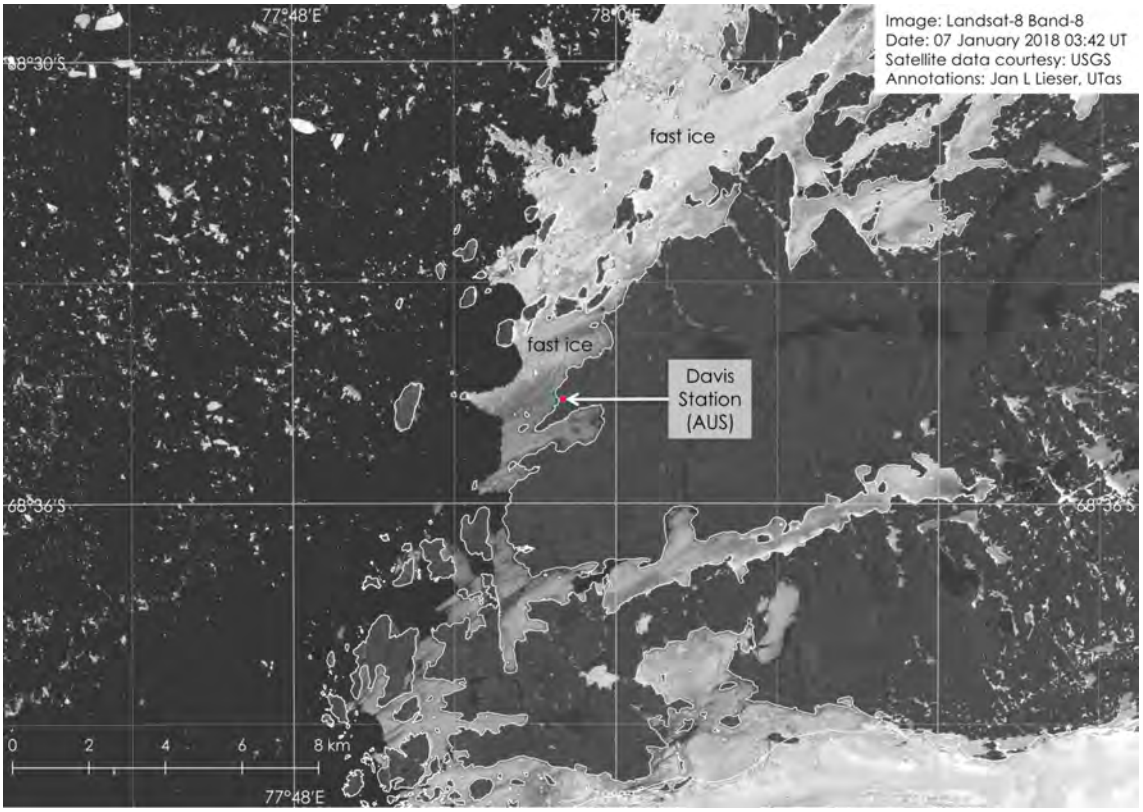

Figure 1: Landsat-8 Band-8 (panchromatic) data acquired 07/01/2018 at 03:42 UT and provided by USGS.

Some fast ice remains in sheltered near-shore areas. Off the fast-ice edge, the ocean is covered by ice debris of both, melting ex-fast ice and glacial ice (icebergs and iceberg fragments).

Sabrina Coast

Figure 2 shows a visible scene of Law Dome and vicinity.

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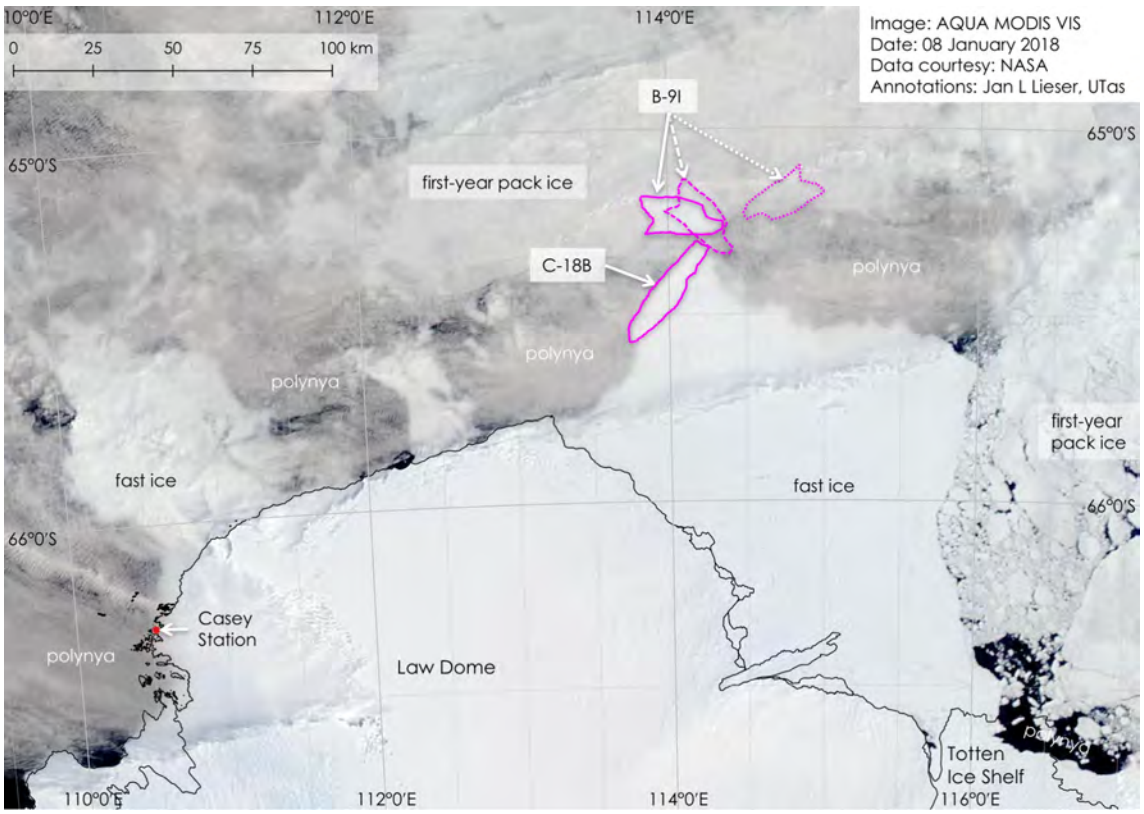

Figure 2: AQUA MODIS VIS data acquired 08/01/2018 and provided by NASA.

Further to Sea Ice Report #02.1/2018, the continued rotation (another 25 degree) of iceberg B-9I can be seen (dotted position from 04/01/2018, dashed position from 07/01/2018).

Off the northwestern flank of Law Dome, fast ice continues to break up. North of Totten Ice Shelf, some open water is found and the first-year pack ice is melting and breaking further while drifting north.

D'Urville Sea

Figure 3 shows a SAR scene of Cape Denison/Commonwealth Bay and offshore. North of Cape Denison, dashed, pink shapes indicate the positions of three large, tabular icebergs on 30/11/2017.

Icebergs B-9B and C-15 continue their general northward shift and iceberg C-34 appears to be dragging slightly westward. Iceberg C-29 remains grounded.

While Commonwealth Bay (off Cape Denison) is largely free of fast ice (only some pack ice remains at the northwestern edge of the bay), some fast ice remains attached to the coast (including the shore off Dumont D'Urville Station).

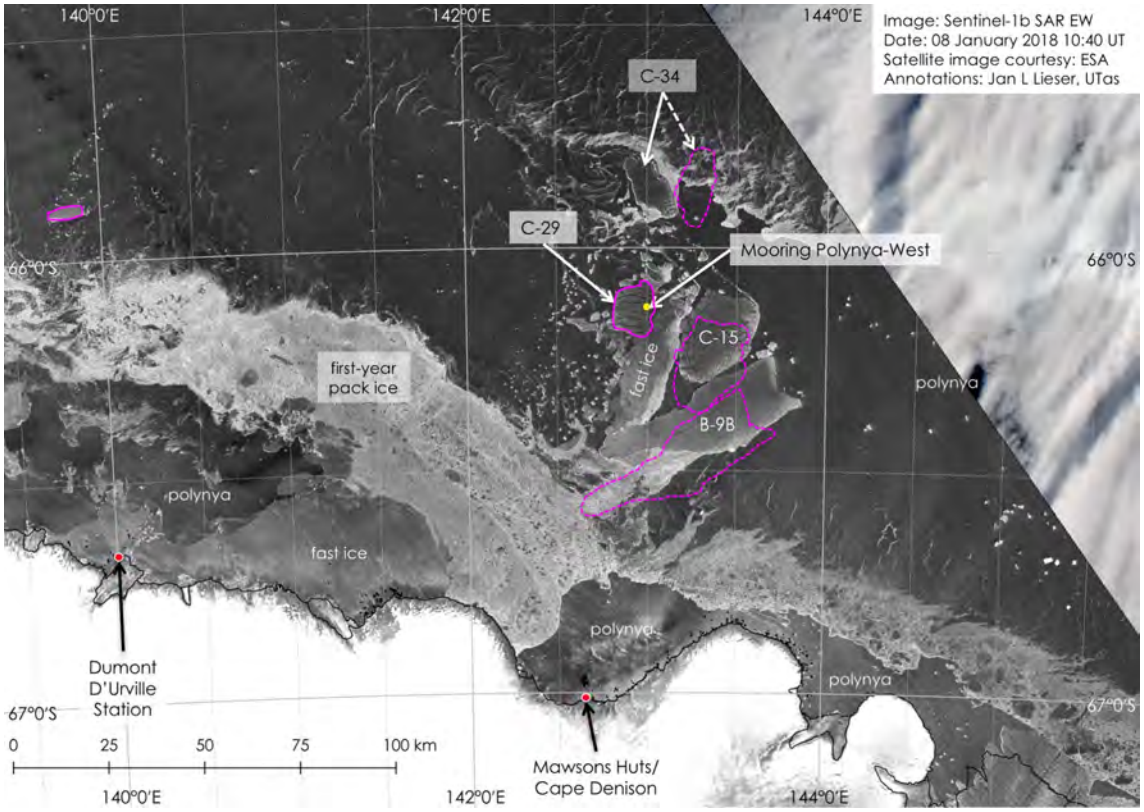

Figure 3: Sentinel-1b SAR EW scene acquired 08/01/2018 at 10:40 and provided by PolarView.

Sea Ice Report #02.4/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

10/01/2018

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for December 2017.

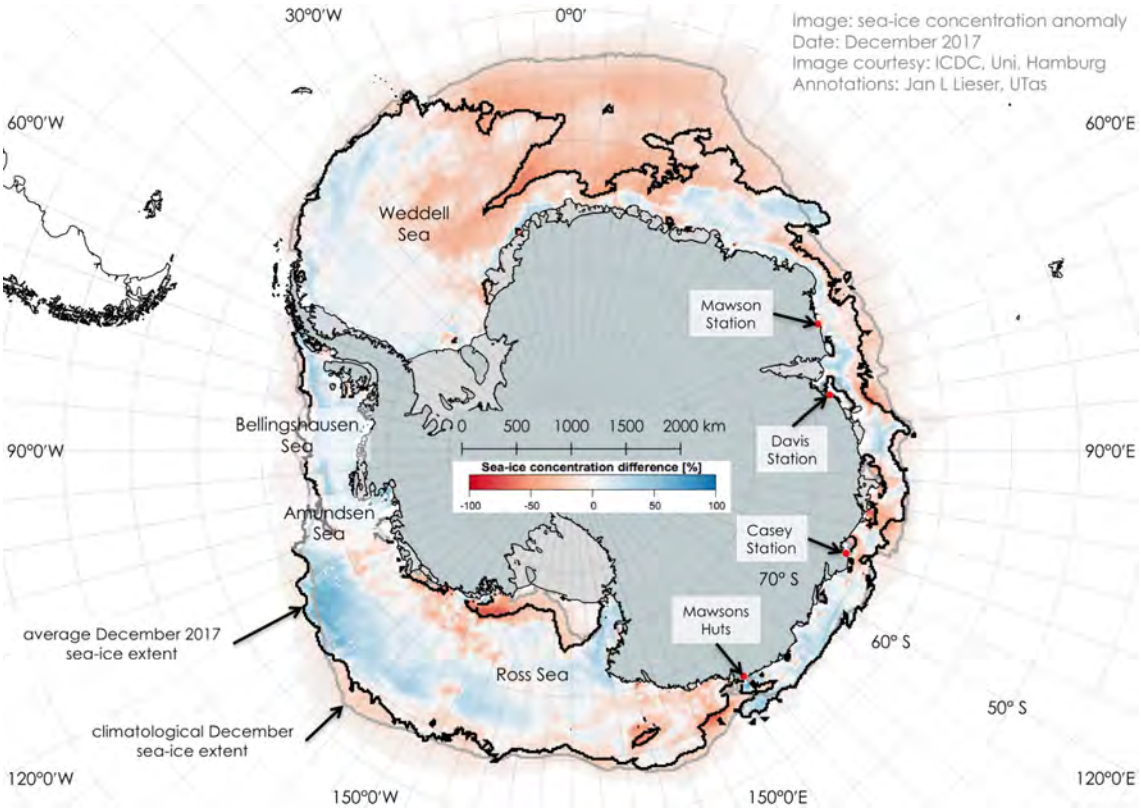

Figure 1: Sea-ice concentration anomaly for December 2017 provided by ICDC, Universität Hamburg.

The most prominent feature of December 2017 is the very low sea-ice extent in the eastern Weddell Sea, which followed on from the Maud Rise polynya. East Antarctica shows a mixed and patchy signal of above and below average sea-ice concentration and extent. At 145° E, a sharp contrast exists between above average sea-ice concentration to the west and below average conditions to the east. The Ross Sea shows strongly below average sea-ice concentration near-shore at 155° W. Further east from there, Amundsen Sea and Bellingshausen Sea show largely average sea-ice extent, as does the western Weddell Sea.

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Mawson Station

Figure 2 shows visible data off Mawson Coast.

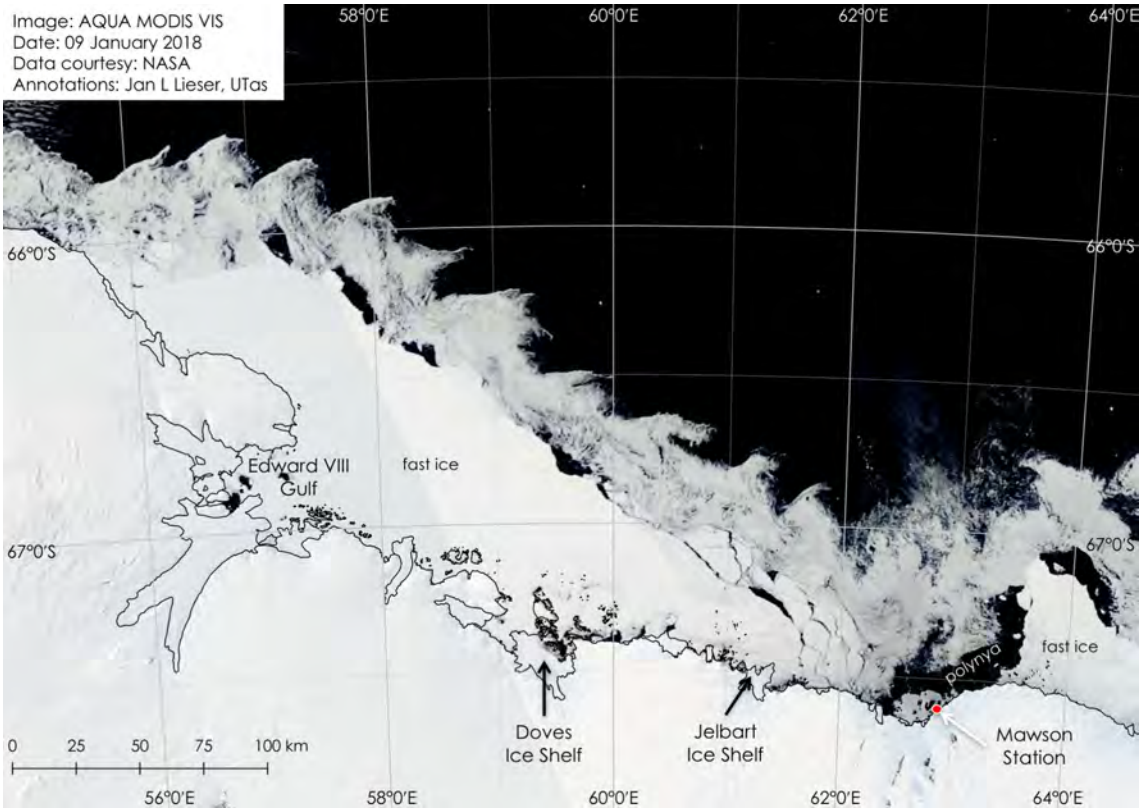

Figure 2: AQUA MODIS VIS scene acquired 09/01/2018 and provided by NASA.

West of Mawson Station, further break-up of fast ice can be seen. East of Jelbart Ice Shelf, fast ice breaks from the edge, but west of the shelf, many holes in the fast ice are evident near shore, particularly north of Doves Ice Shelf and in Edward VIII Gulf.

Off the fast-ice edge, the sea-ice edge shows a distinctive seesaw shape, which appears to be due to an interplay between wind forcing and small-scale oceanic surface eddies.

Sea Ice Report #02.5/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

11/01/2018

Cooperation Sea

Figure 1 shows a sea-ice concentration chart of Cooperation Sea.

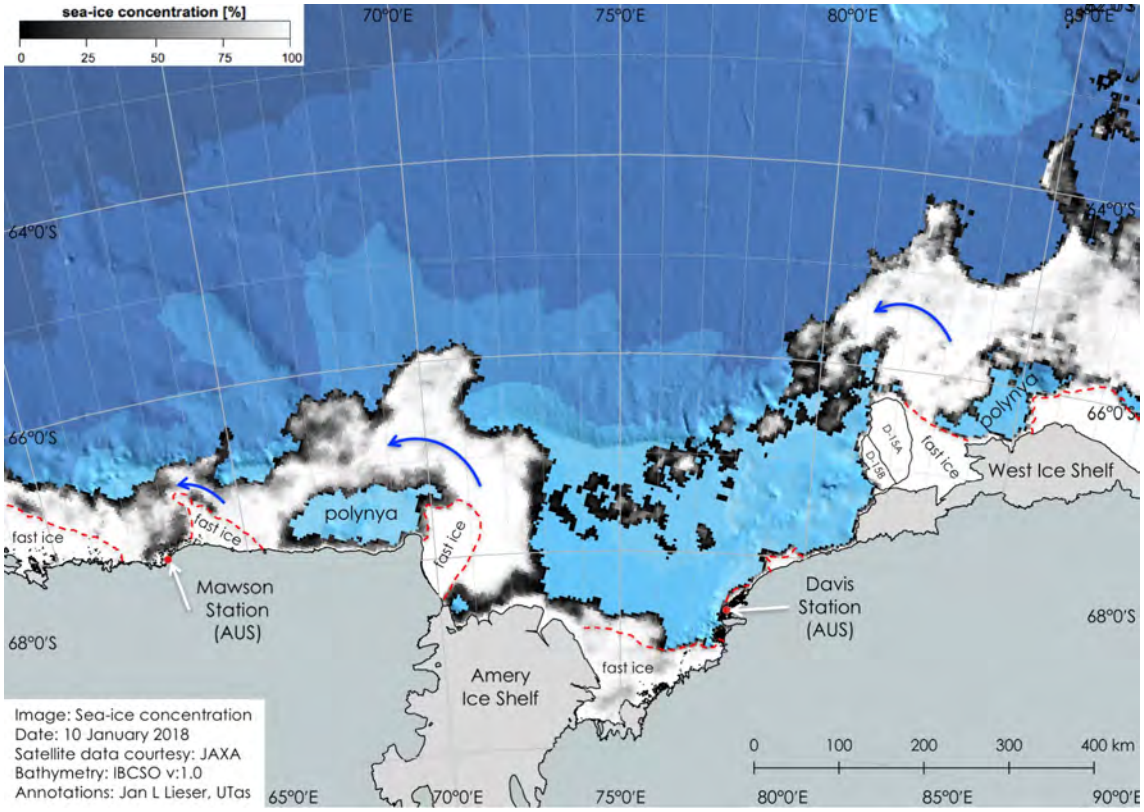

Figure 1: Sea-ice concentration data acquired 10/01/2018 and provided by ICDC, Universität Hamburg.

North of Mawson Station, most of the sea ice is broken and melting, but some fast ice is still attached to the shore east and west along Mawson Coast and approximately 3.5 nautical miles immediately off the station. Further north, pack ice is still transported westward from the area north of the Amery Ice Shelf.

North of Davis Station, only minimal sea ice remains, but the region is still fed more sea ice from a reservoir north of the West Ice Shelf and the D-15 icebergs.

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Davis Station

Figure 2 shows a very high-resolution visible scene of Davis Station.

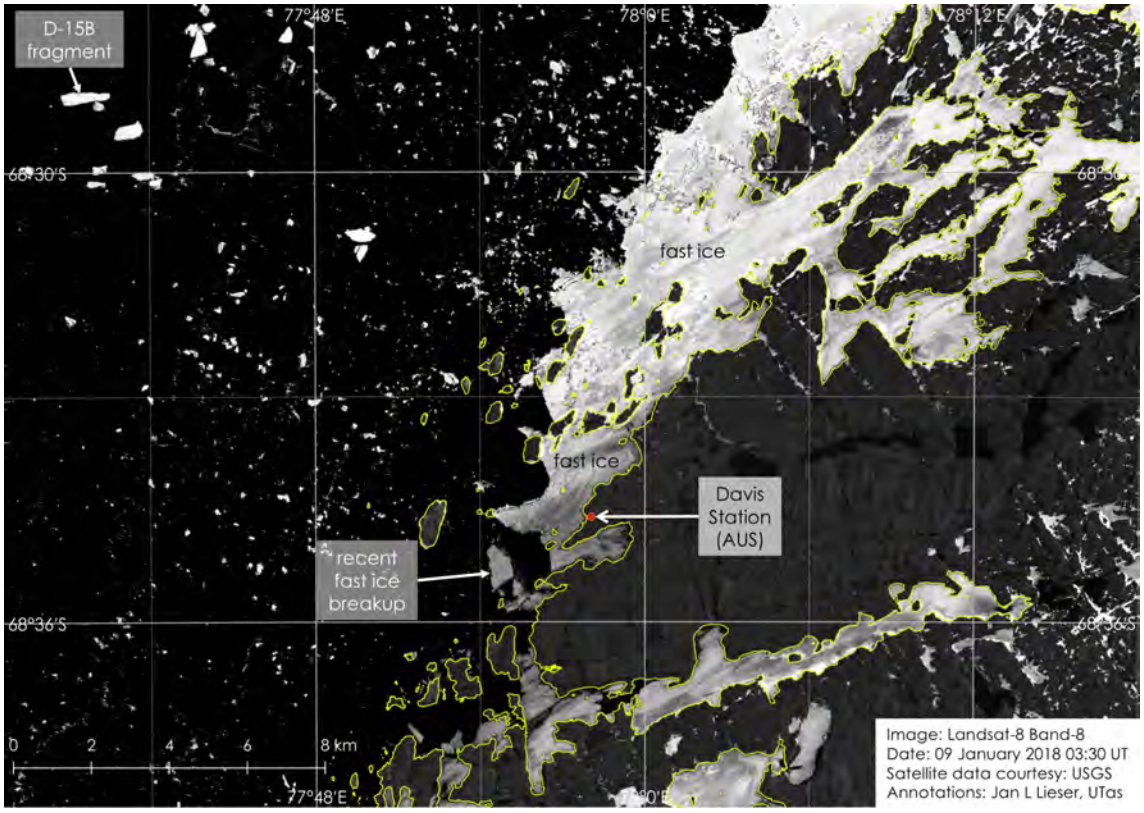

Figure 2: Landsat-8 Band-8 (panchromatic) data acquired 09/01/2018 at 03:30 UT and provided by USGS.

Still about 0.5 nautical miles of shore-fast sea ice remains at the station, but just south of the station some fast ice has been breaking away from the coast recently.

Offshore, isolated floes of sea ice and icebergs of various shapes and sizes can be seen, including a fragment of iceberg D-15B (see Figure 1 for reference).

Sea Ice Report #02.6/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

12/01/2018

D'Urville Sea

Figure 1 shows a sea-ice concentration chart of D'Urville Sea and the wider surrounds. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01. Pink dots mark large tabular icebergs.

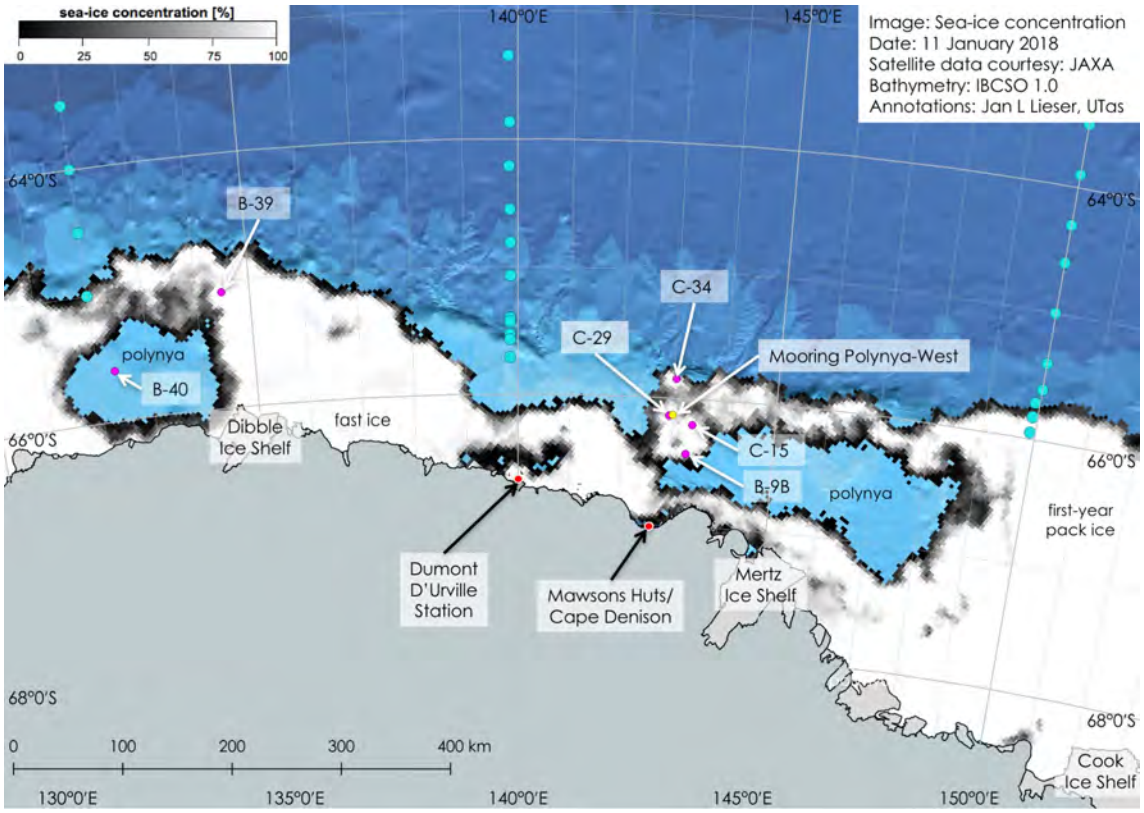

Figure 1: Sea-ice concentration data acquired 11/01/2018 and provided by ICDC, Universität Hamburg.

Northwest of the Dibble Ice Shelf, only the southernmost station appears affected by sea ice of the marginal ice zone. Along 140° E, all proposed stations are largely free of sea ice, whereas along 150° E, at least the southernmost three or four stations have sea ice present in their vicinity.

Throughout the entire region of Figure 1, icebergs and fragments of icebergs can be expected and isolated floes of sea ice might occur as far north as 64° S west of 140° E and as far north as 65° S east of 140° E.

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Figure 2 shows a visible scene of southern D'Urville Sea and the coast between Dumont D'Urville Station and Mawsons Huts.

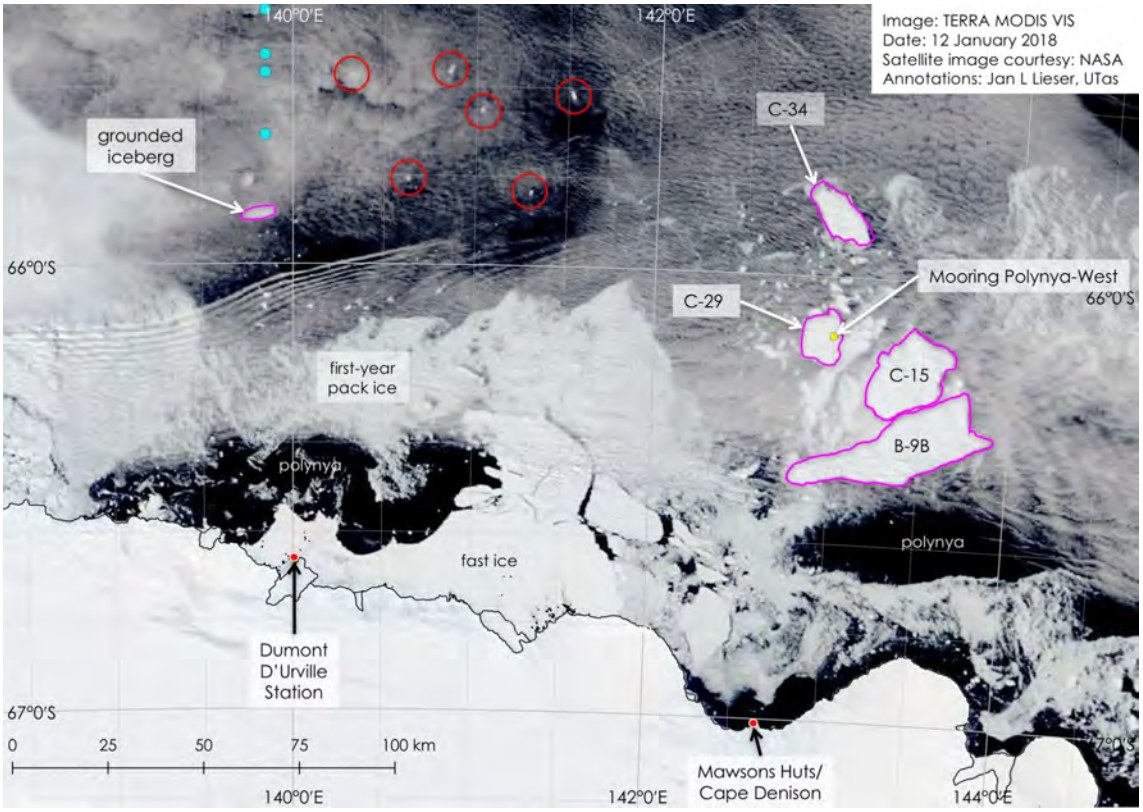

Figure 2: TERRA MODIS VIS data acquired 12/01/2018 and provided by NASA.

North of Cape Denison/Commonwealth Bay, the positions of four large tabular icebergs are distinguishable through the thin clouds. Also, one grounded iceberg (larger than 23 km^2) is marked north of Dumont D'Urville Station.

Red circles highlight large ice fragments, which are either glacial ice or large sea-ice floes, as mentioned above.

Figure 3 shows a visible scene of the southernmost proposed stations along 150° E. During the past 24 hours (roughly since the acquisition of data shown in Figure 1), onshore winds have compacted the sea-ice edge to a well defined line. But a row of many grounded icebergs just west of 150° E and south of 66° S traps pack ice on its westward drift and diverts it north, as indicated by the dark blue arrow in the figure.

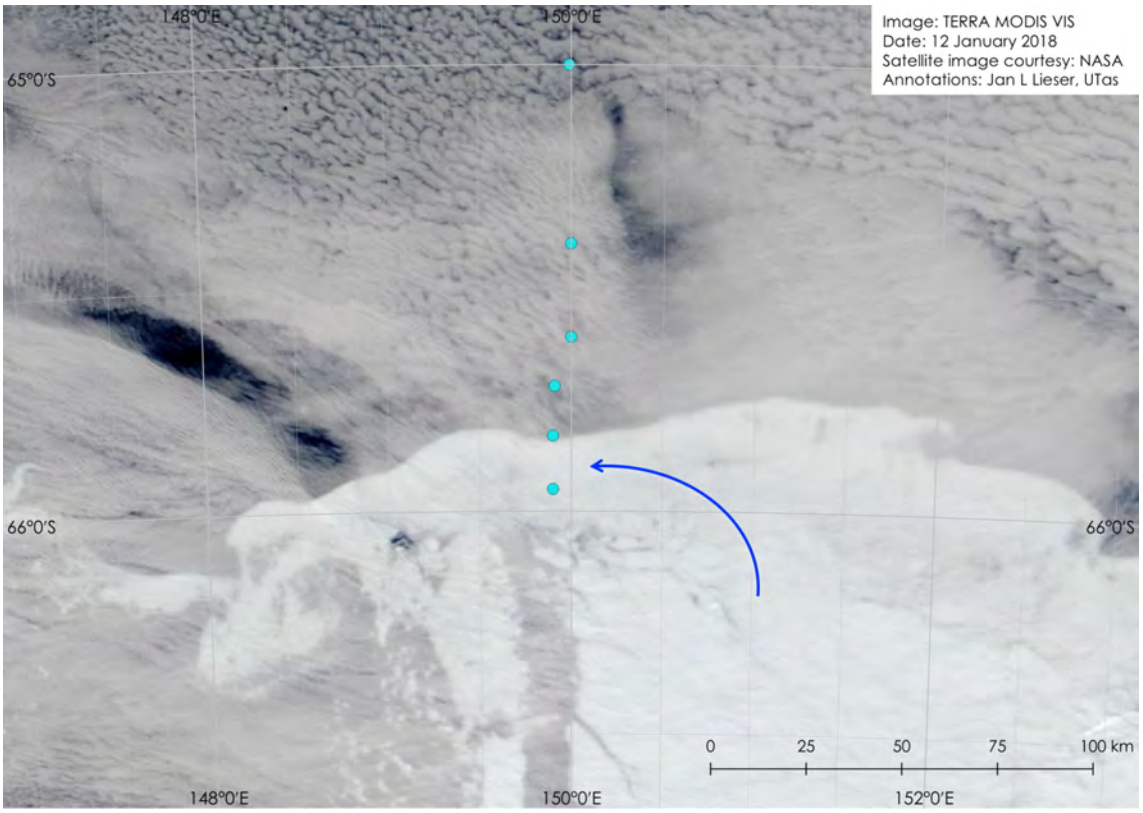

Figure 3: TERRA MODIS VIS data acquired 12/01/2018 and provided by NASA.

Sea Ice Report #03.1/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

15/01/2018

Davis Station

Figure 1 shows a high-resolution SAR scene of Davis Station and offshore.

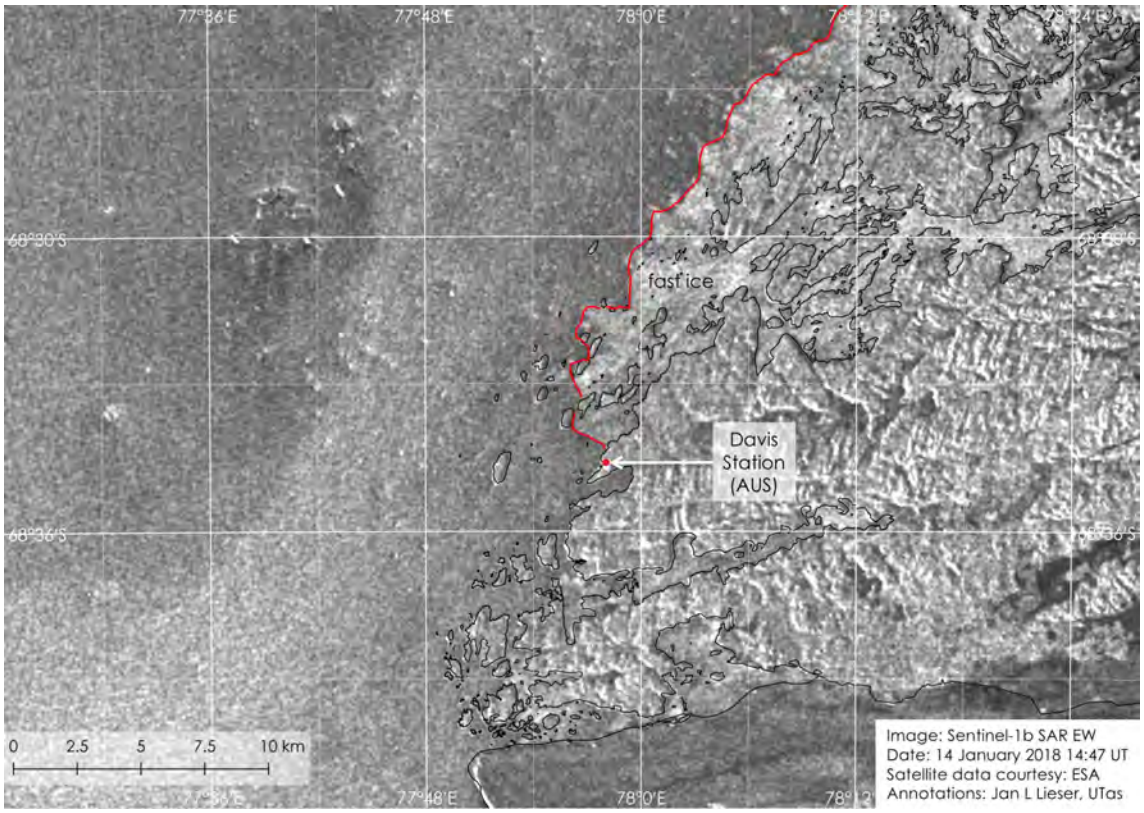

Figure 1: Sentinel-1b SAR EW data acquired 14/01/2018 at 14:47 UT and provided by PolarView.

In the afternoon (local) of 14/01/2018, shore-fast sea ice off the station broke away. However, north of the station, some fast ice remains between sheltered bays of the Vestfold Hills. Further offshore, grounded and free floating icebergs are present.

Sabrina Coast

Figure 2 shows a high-resolution SAR scene of Law Dome and offshore. The interaction of iceberg B-9I with iceberg C-18B is illustrated with the various

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shapes north of iceberg C-18B (from east/white to west/pink: 04/01/2018; 07/01/2018; 08/01/2018; 10/01/2018).

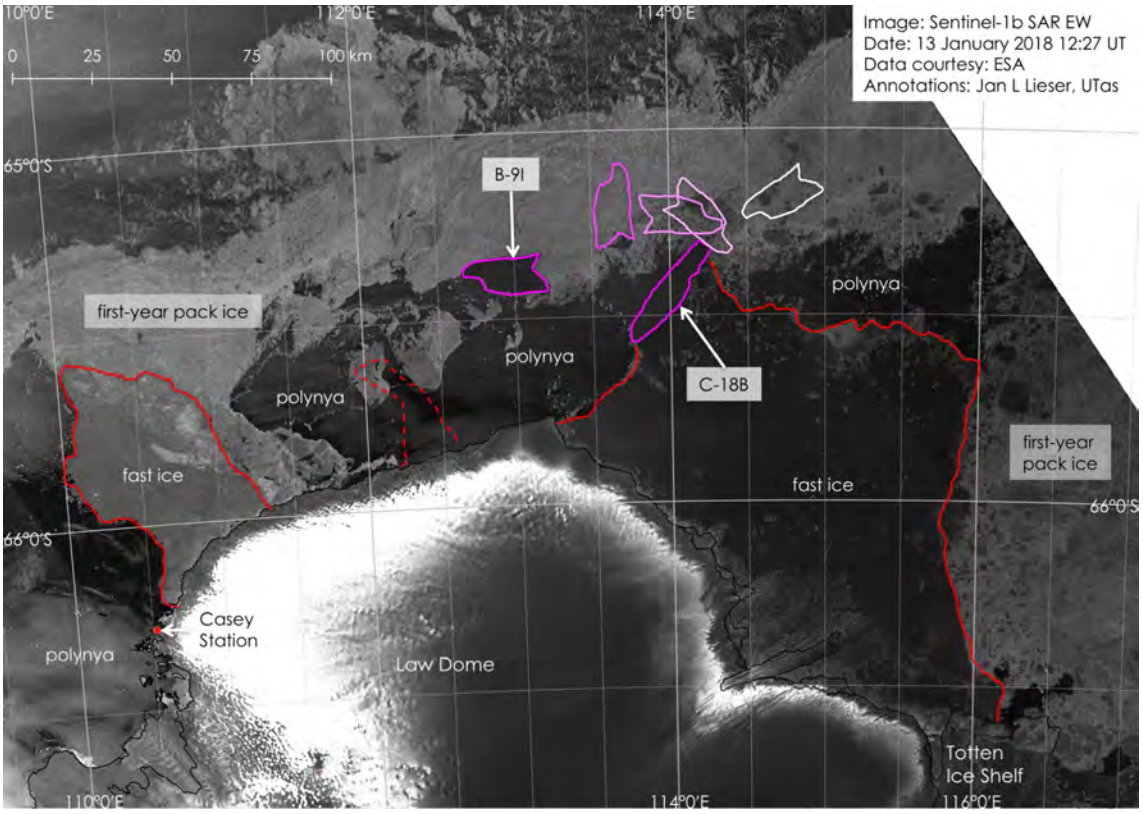

Figure 2: Sentinel-1b SAR EW data acquired 13/01/2018 at 12:27 UT and provided by PolarView.

Iceberg B-9I remains just north of the 500 m isobath and is drifting further westward.

At the northern flank of Law Dome, the dashed, red shape indicates where fast ice recently collapsed and a combined polynya is now present.

Sea Ice Report #03.2/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

15/01/2018

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01. Pink shapes mark large tabular icebergs.

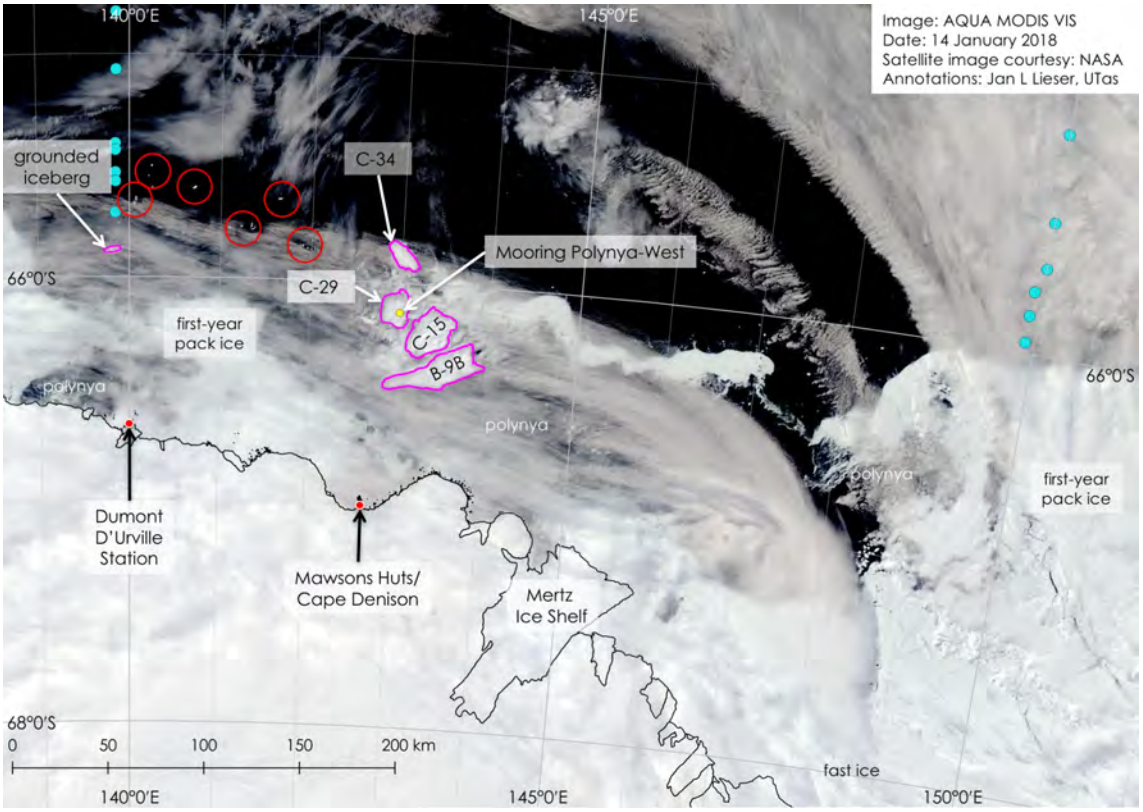

Figure 1: AQUA MODIS VIS data acquired 14/01/2018 and provided by NASA.

Along 140° E, all proposed stations are largely free of sea ice but can be affected by icebergs or large, old sea ice floes drifting westward (some are marked by red circles). Along 150° E, the sea-ice edge has been pushed southward and the southernmost stations have now only very little sea ice present.

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Sea Ice Report #03.3/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

17/01/2018

Cooperation Sea

Figure 1 shows a sea-ice concentration chart of Cooperation Sea. Locations of acoustic whale recorder moorings are given by green dots. Blue arrows in the figure indicate the general sea-ice drift direction.

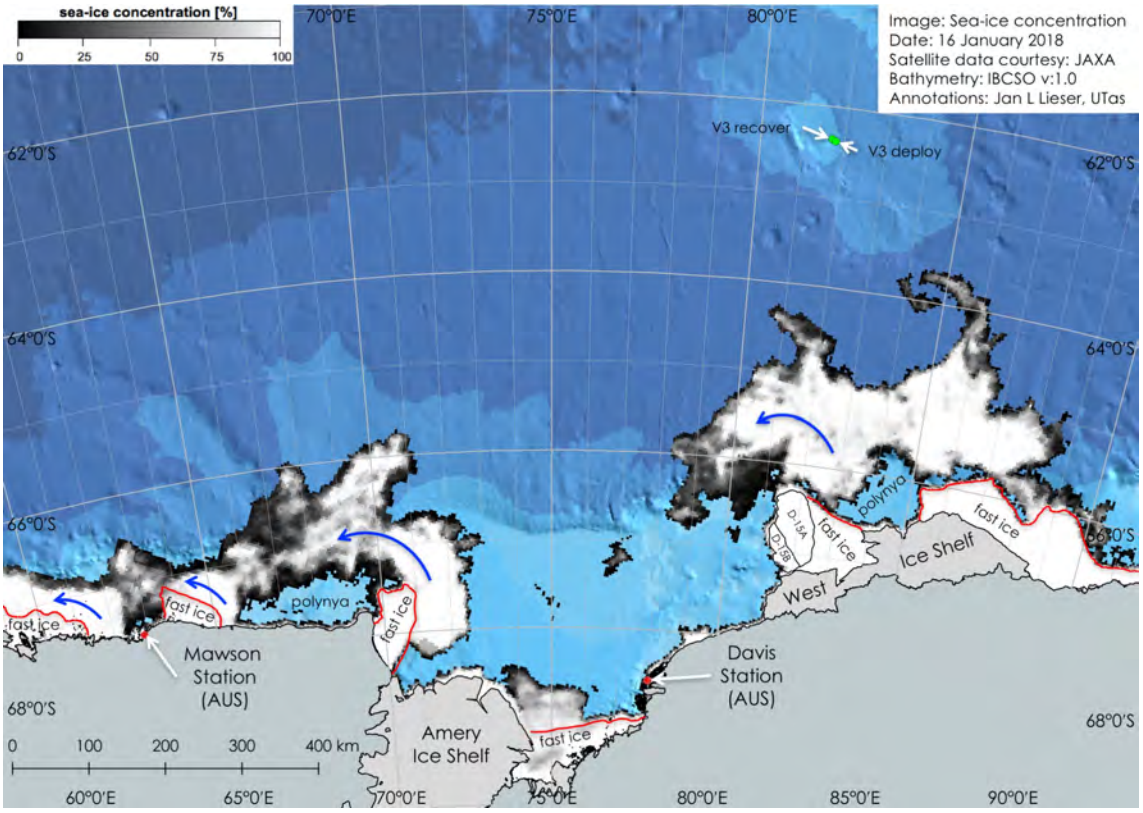

Figure 1: Sea-ice concentration data acquired 16/01/2018 and provided by Universität Hamburg.

Summer sea-ice extent is shown in the area. Off Mawson Station, little fast ice remains attached to the shore but east and west of the station fast ice continues to break up and drift westwards.

Off the West Ice Shelf, some pack ice remains and is drifting west.

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Davis Station

Figure 2 shows a high-resolution visible scene of Davis Station and offshore.

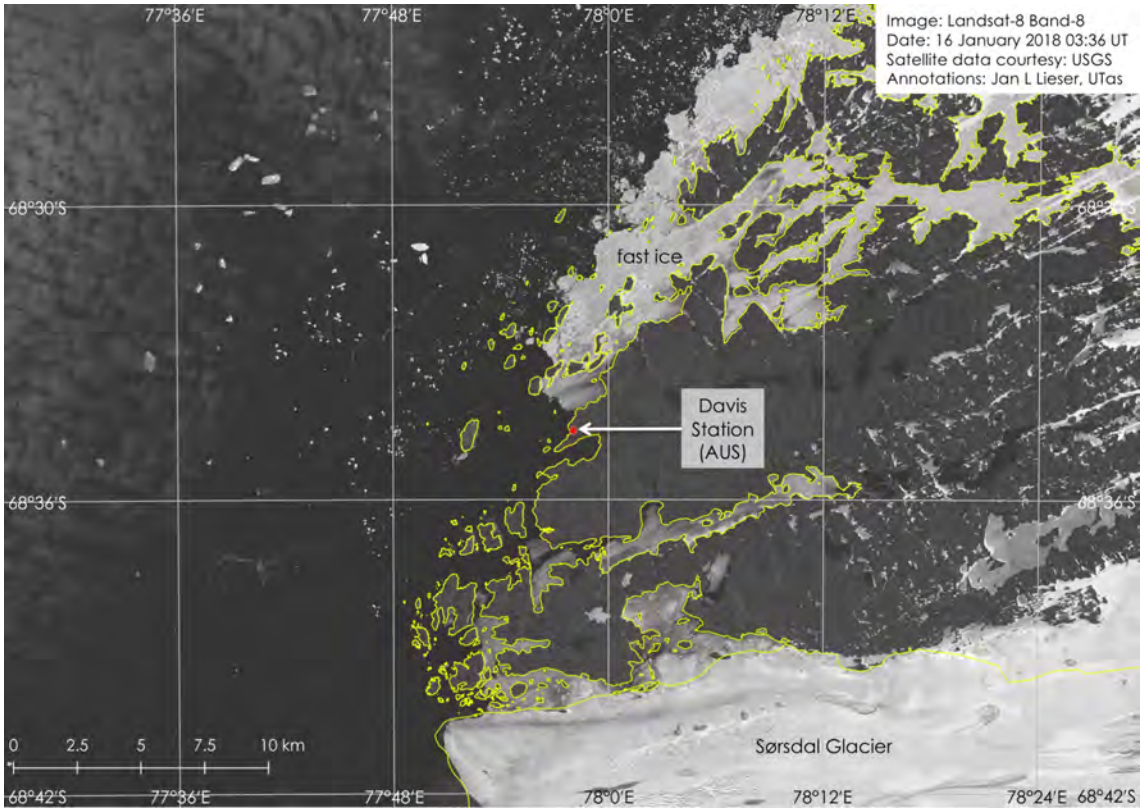

Figure 2: Landsat-8 Band-8 (panchromatic) data acquired 16/01/2018 at 03:36 UT and provided by USGS.

Off Davis Station, open water can be seen, while further north some fast ice remains between islands and sheltered bays. Offshore, isolated floes of sea ice and icebergs are present.

Sea Ice Report #03.4/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre Sea Ice Service*

Analyst: Jan L Lieser

18/01/2018

Mawson Station

Figure 1 shows a high-resolution SAR scene of Mawson Coast.

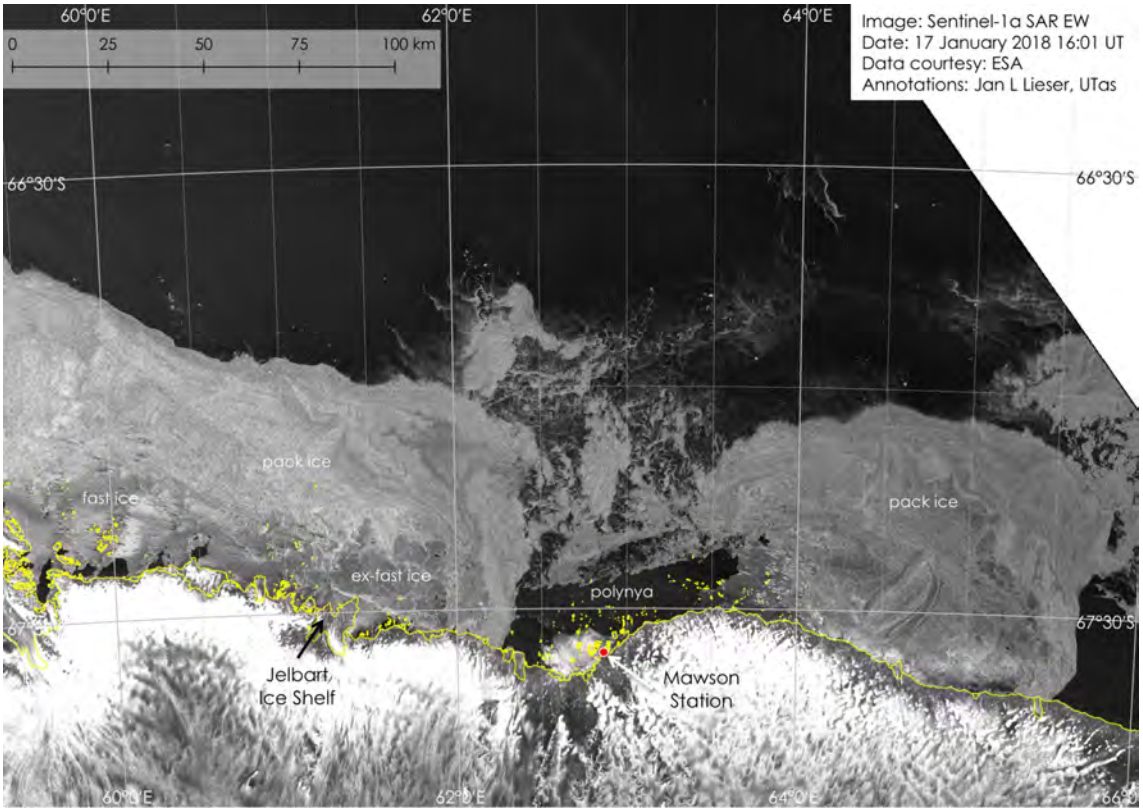

Figure 1: Sentinel-1a SAR EW data acquired 17/01/2018 at 16:01 UT and provided by PolarView.

Off Mawson Coast, sea ice is melting and fast ice is breaking up. Pack ice appears to consist of many small to medium-sized floes, but east of Jelbart Ice Shelf, ex-fast ice can be seen as large floes near shore.

Off Mawson Station, roughly 2.4 nautical miles of fast ice extends northward (see Figure 2). The offshore polynya is separated from the open ocean by fields of loose sea ice, although this sea ice shows locally high concentration.

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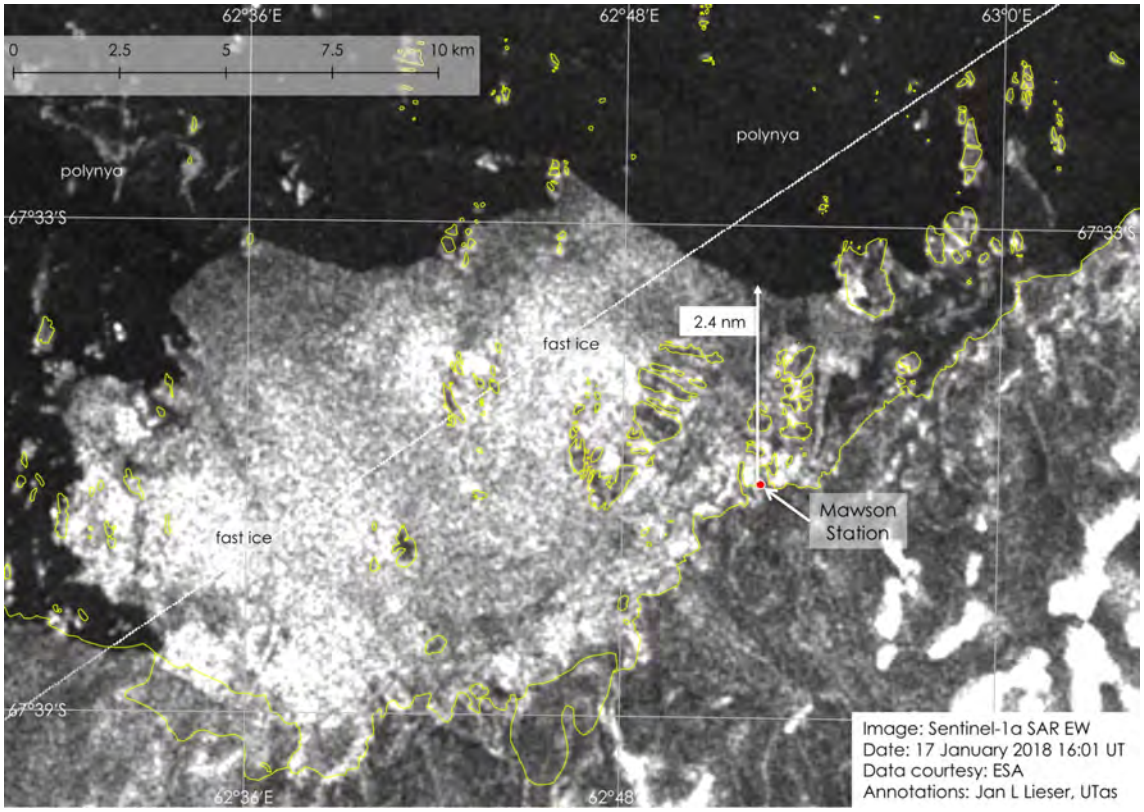

Figure 2: Sentinel-1a SAR EW data; zoom of Figure1. The white, diagonal line is an image artefact where two SAR tiles are stitched together.

Sea Ice Report #03.5/2018

by the Antarctic Climate & Ecosystems Cooperative Research Centre
Sea Ice Service*

Analyst: Jan L Lieser

19/01/2018

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01. Pink shapes mark large tabular icebergs.

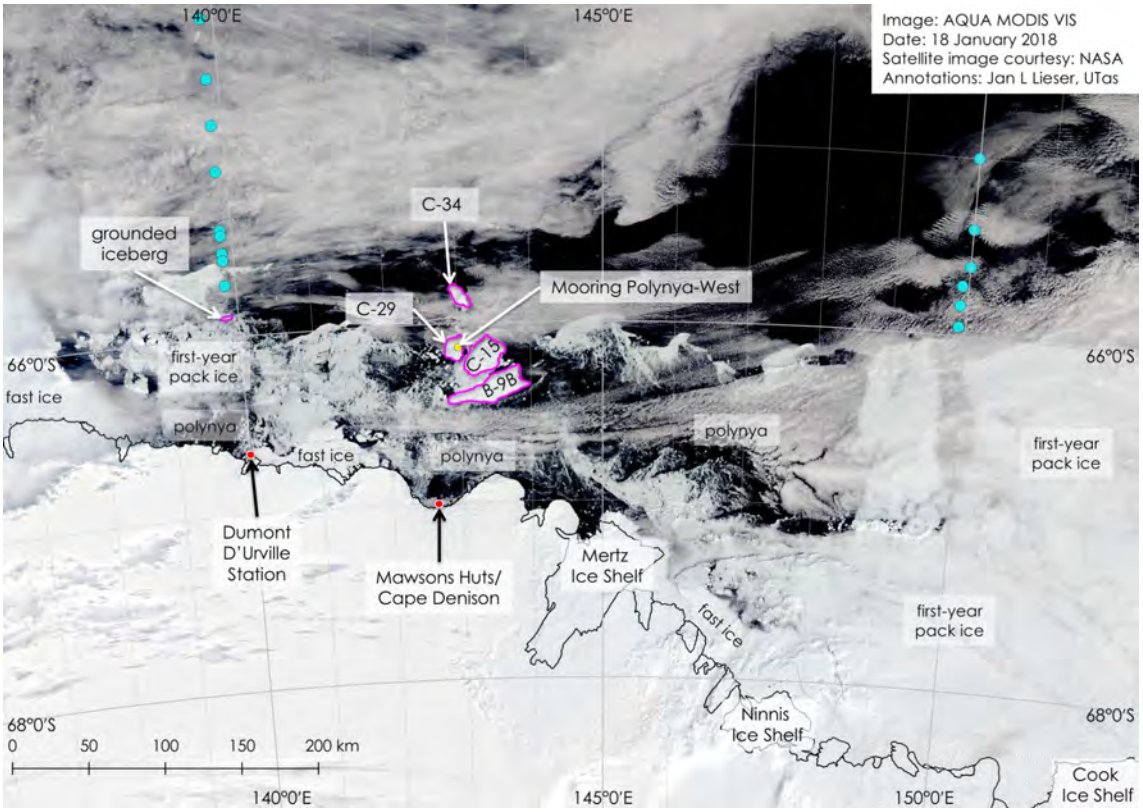

Figure 1: AQUA MODIS VIS data acquired 18/01/2018 and provided by NASA.

A recent fresh, westerly breeze helped redistribute sea ice in the region. Along 140° E, some loose sea ice has been drifting across the southernmost proposed stations. Along 150° E, first-year sea ice had been pushed eastward, which created a gap between a long row of grounded icebergs (just west of 150° E) and the main body of pack ice reaching as far south as 67° S.
But since the acquisition of the data shown in Figure 1, winds have shifted again to a moderate easterly breeze, which will assist in moving the sea-ice edge again.

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Sea Ice Report #04.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
23/01/2018

D'Urville Sea

Figure 1 shows a sea-ice concentration chart of D'Urville Sea. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01. Positions of known large tabular icebergs are marked by pink dots.

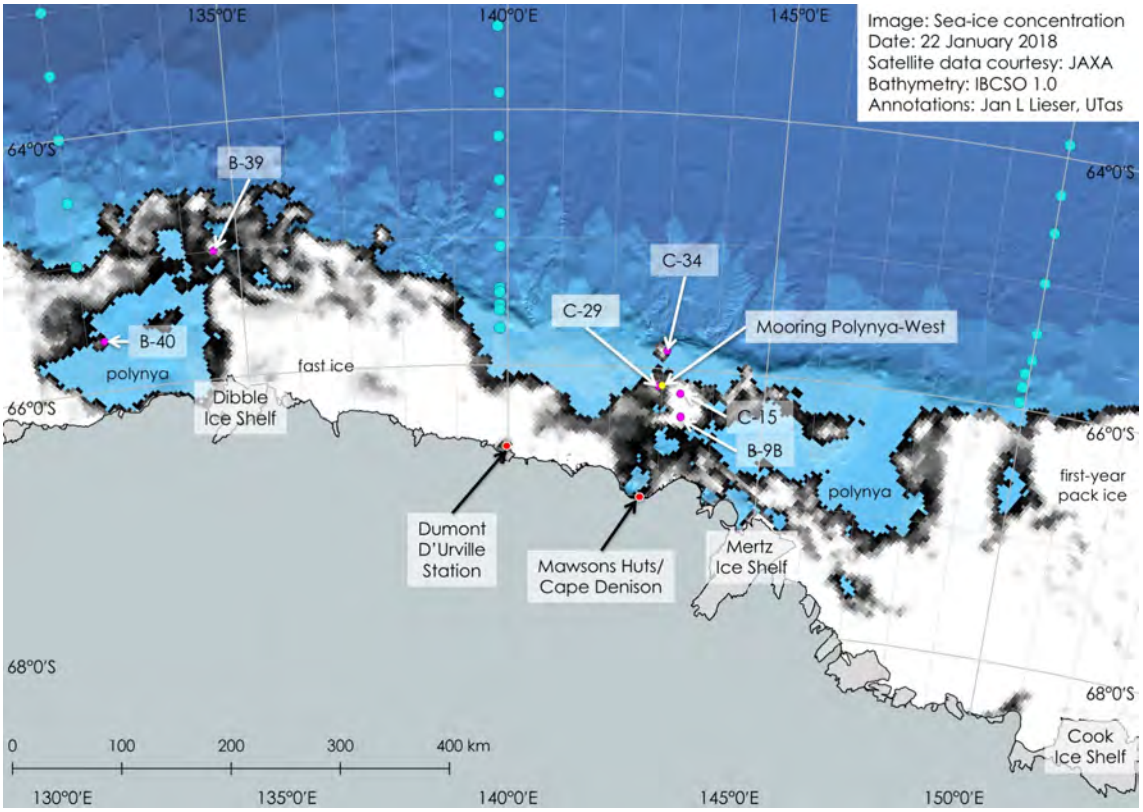

Figure 1: Sea-ice concentration data acquired 22/01/2018 and provided by Universität Hamburg.

The sea-ice edge remains mobile in the region and the southernmost proposed stations are affected by fluctuating sea-ice conditions, when strips and patches of melting sea ice drift across the locations. Such low sea-ice concentrations are not always detected by the algorithm analysing the AMSR-2 microwave data.

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Sea Ice Report #04.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
23/01/2018

Mawson Station

Figure 1 shows a very high-resolution panchromatic (visible) scene of Mawson Station. The scene is affected by thin clouds.

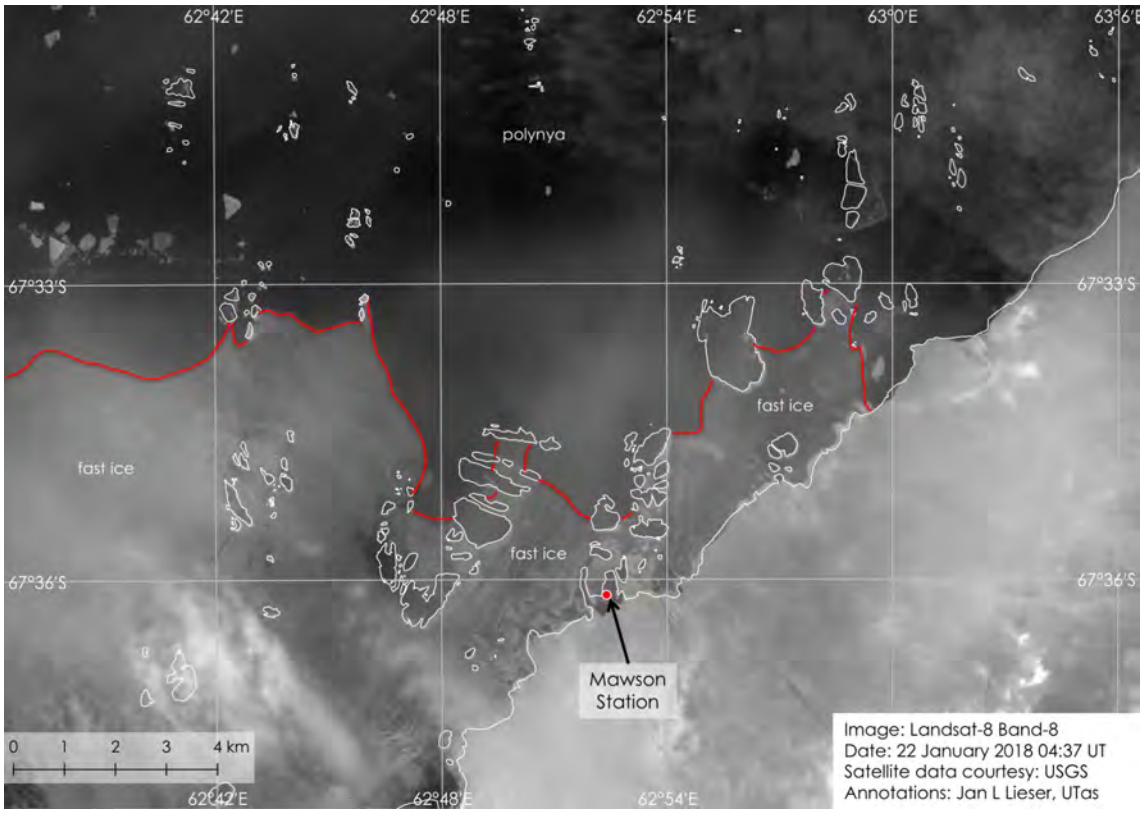

Figure 1: Landsat-8 Band-8 (panchromatic) data acquired 22/01/2018 at 04:37 UT and provided by USGS.

Off Mawson Station, large portions of fast ice have broken off and the fast-ice edge is less than 1 nautical mile away from the station. The polynya off the fast-ice edge remains separated from the open ocean by loose fields of sea ice, but this sea ice exhibits locally high concentration.

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Sea Ice Report #04.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
24/01/2018

Davis Station

Figure 1 shows a high-resolution SAR scene of Davis Station.

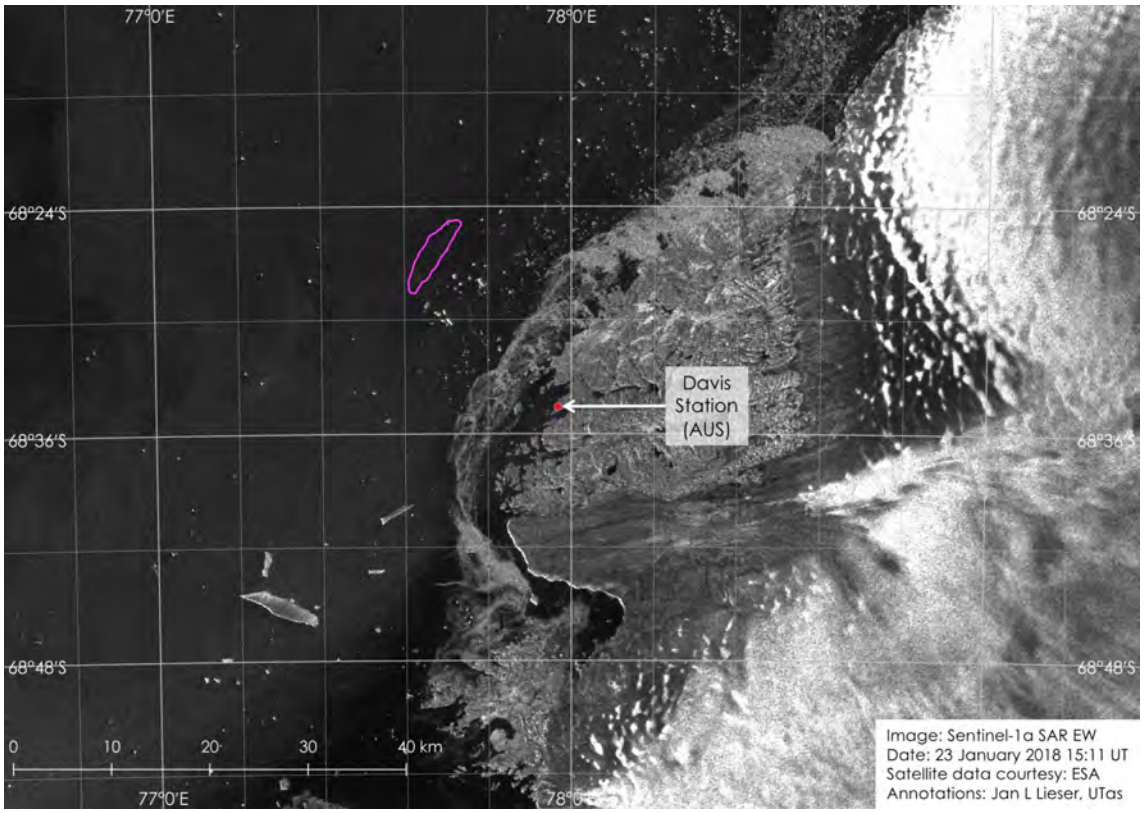

Figure 1: Sentinel-1a SAR EW data acquired 23/01/2018 at 15:11 UT and provided by PolarView.

Off the Vestfold Hills, a large iceberg drifted south during the past week. It is a splinter of the D-15 icebergs, which are grounded north of the West Ice Shelf. It is roughly 8.3 km long and has a surface of approximately 12.4 km^2. Between 20/01/2018 (pink shape) and the acquisition shown in Figure 1, the berg drifted close to 40 km southwestward.

Immediately north of Davis Station, Abatus Bay is now free of fast ice and fast ice appears to be breaking further. Off the offshore islands, bands of loose patches of melting ex-fast ice are drifting southward.

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Sea Ice Report #04.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
25/01/2018

Mawson Station

Figure 1 shows a scene of Mawson Coast.

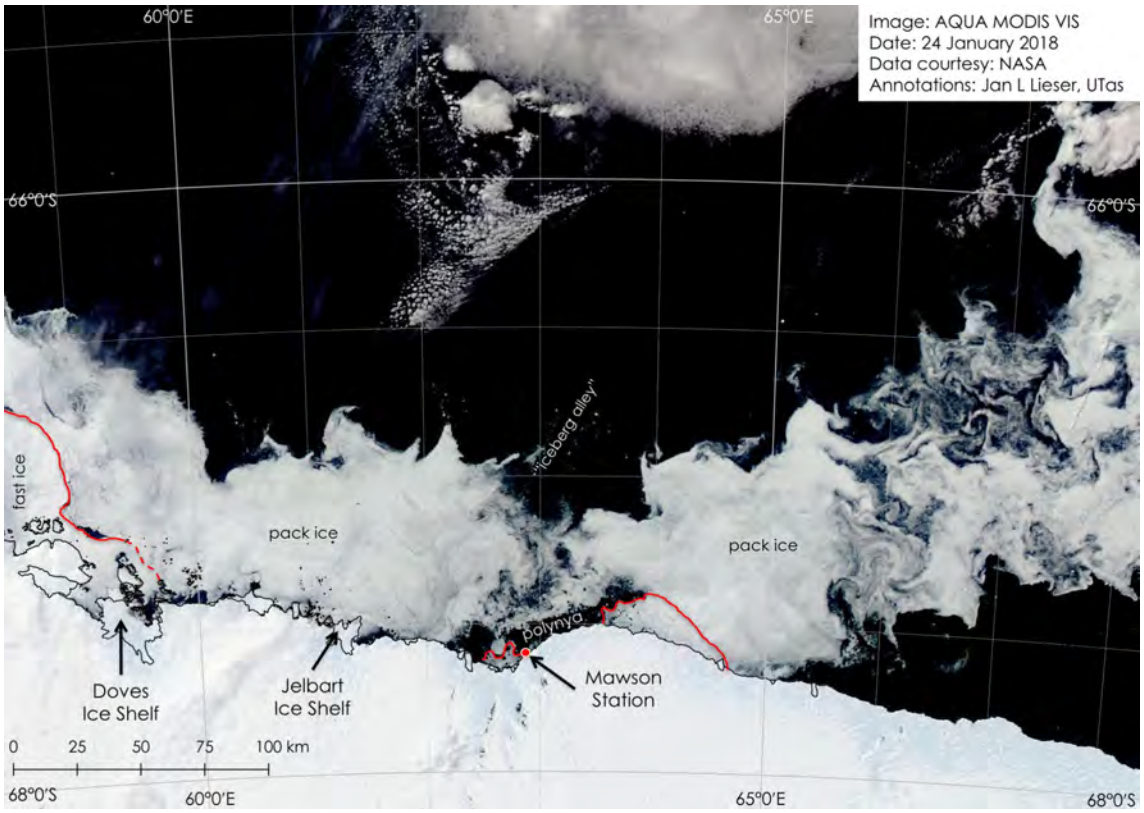

Figure 1: AQUA MODIS VIS data acquired 24/01/2018 and provided by NASA.

West of Mawson Station, shore-fast sea ice has broken off towards Doves Ice Shelf and only farther west some fast ice remains attached to the coast. East of the station, only a little fast ice is still shore-fast. In the immediate vicinity of the station, fast ice keeps breaking up, but currently some fast ice is still in Horseshoe Harbour and off Lee Island towards Béchervaise Island and south of that.

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Sea Ice Report #04.5/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
25/01/2018

D'Urville Sea

Figure 1 shows a sea-ice concentration chart of D'Urville Sea. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01. Positions of known large tabular icebergs are marked by pink dots.

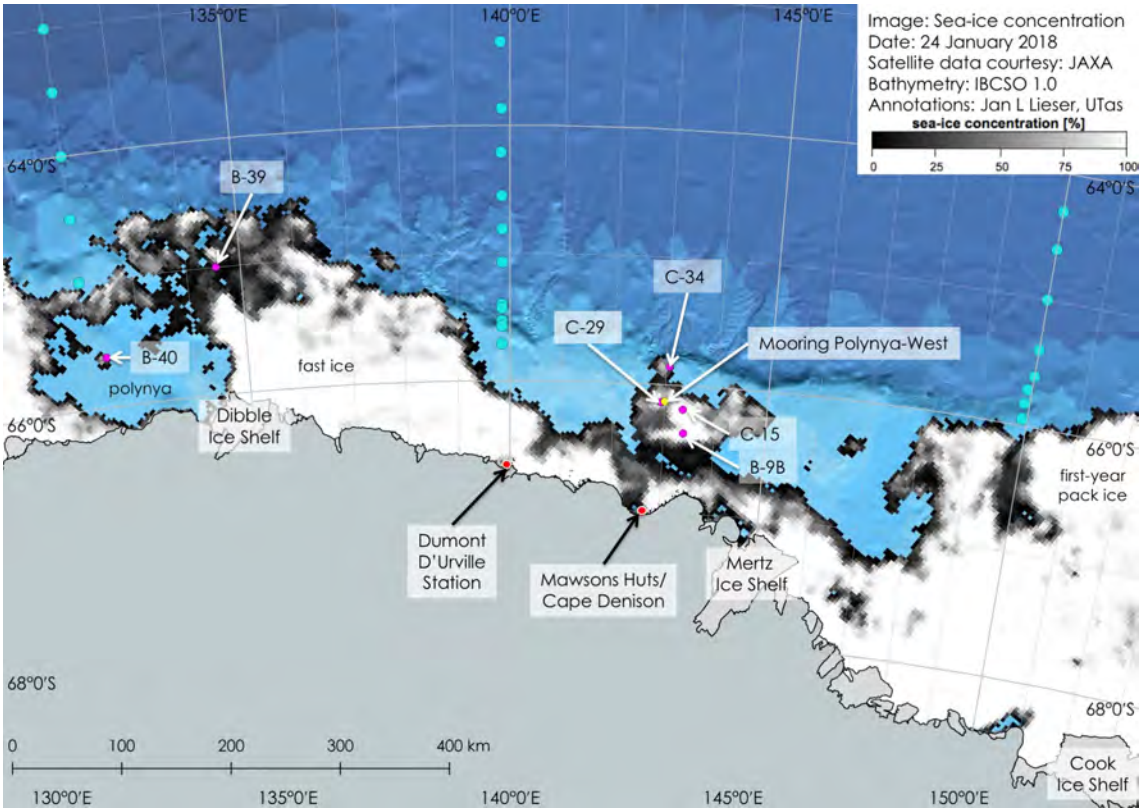

Figure 1: Sea-ice concentration data acquired 24/01/2018 and provided by Universität Hamburg.

Along 132° E and 150° E, the southernmost proposed stations are affected by fluctuating sea-ice conditions, when strips and patches of melting sea ice drift across the locations. The southernmost stations along the 140° E transect appear free of sea ice, but generally south of 64° S some sea ice may be encountered as isolated floes or small patches of old sea ice, as very low sea-ice concentrations locally are not always detected by the algorithm analysing the AMSR-2 microwave data.

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Sea Ice Report #05.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
29/01/2018

Cooperation Sea

Figure 1 shows a composite of high-resolution SAR scenes and sea-ice concentration data of the region between Mawson Station and Davis Station. The orange line marks the recent track of RSV *Aurora Australis* (up until 29/01/2018 02:30 UT).

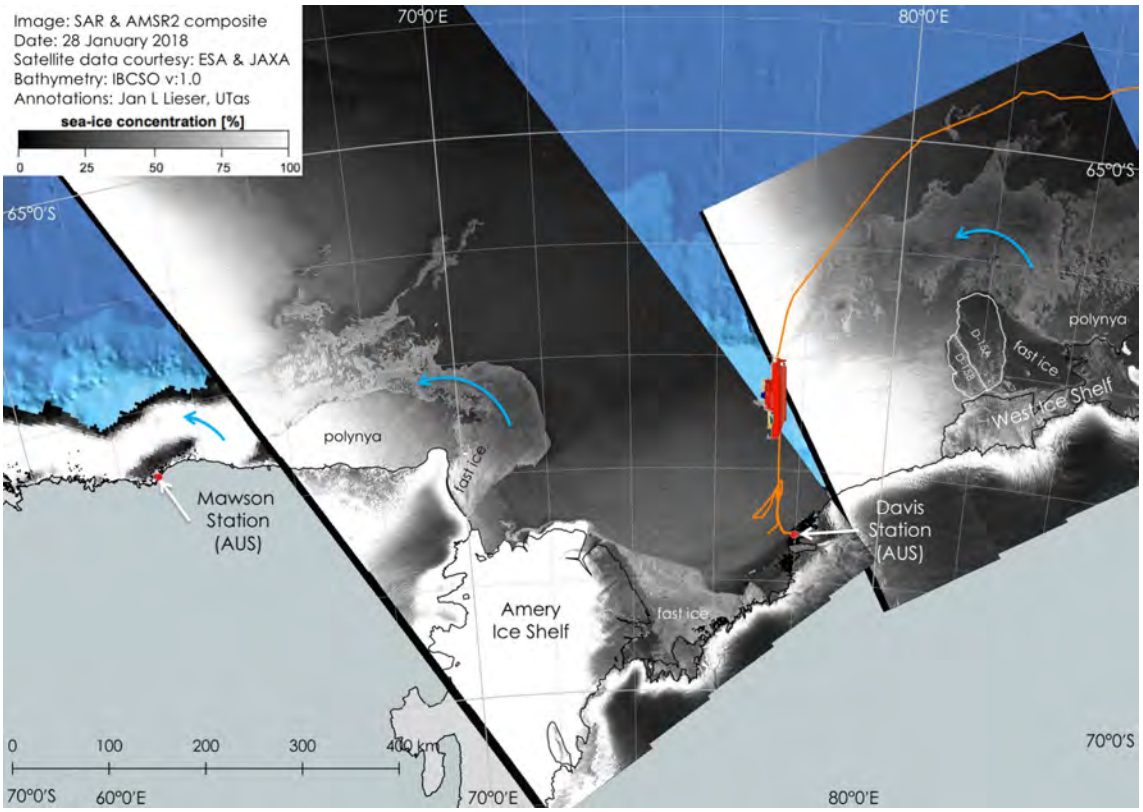

Figure 1: Sea-ice concentration data acquired 28/01/2018 and provided by Universität Hamburg; overlays of Sentinel-1a SAR EW data acquired 28/01/2018 at 15:21 UT (western scene) and Sentinel-1b SAR EW data acquired 28/01/2018 at 14:30 UT (eastern scene), both provided by PolarView.

Northeast of the Amery Ice Shelf, Prydz Bay is largely free of sea ice except for its southern end, where fast ice and ex-fast ice are confined. North of the Amery Ice Shelf, fast ice is still attached east of Cape Darnley and ex-fast ice is drifting westward forming a large polynya off Mawson

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Coast. Some strips and patches of decaying sea ice drift northward, partially crossing 66° S northward in places.

North of the West Ice Shelf, the rift between icebergs D-15A and D-15B has a width of more than 4.5 km at its northern end and is widening (it was less than 3.5 km at the end of August 2017).

Law Dome

Figure 2 shows a visible scene of Law Dome and offshore.

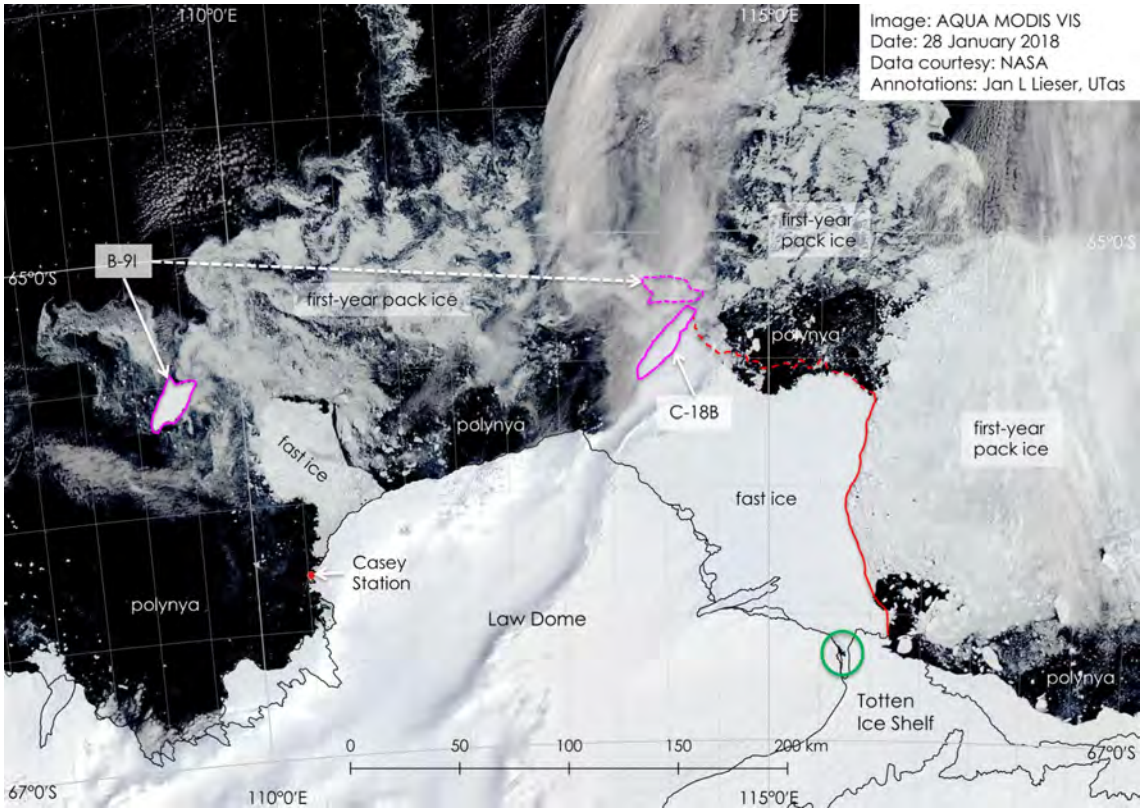

Figure 2: AQUA MODIS VIS scene acquired 28/01/2018 and provided by NASA.

Northeast of Law Dome, a polynya is nibbling fast ice off the fast-ice edge (the dashed, red line marks the fast-ice edge on 08/01/2018). Iceberg B-9I has continued its journey westward (the dashed, pink shape marks its position on 08/01/2018; see Sea Ice Report #03.1/2018).

North of Totten Ice Shelf, an area of open water surrounded by glacier in the west, ice shelf in the east and fast ice in the north has reappeared during summer (green circle in Figure 2), but its size is much smaller than last year.

D'Urville Sea

Figure 3 shows a visible scene of D'Urville Sea.

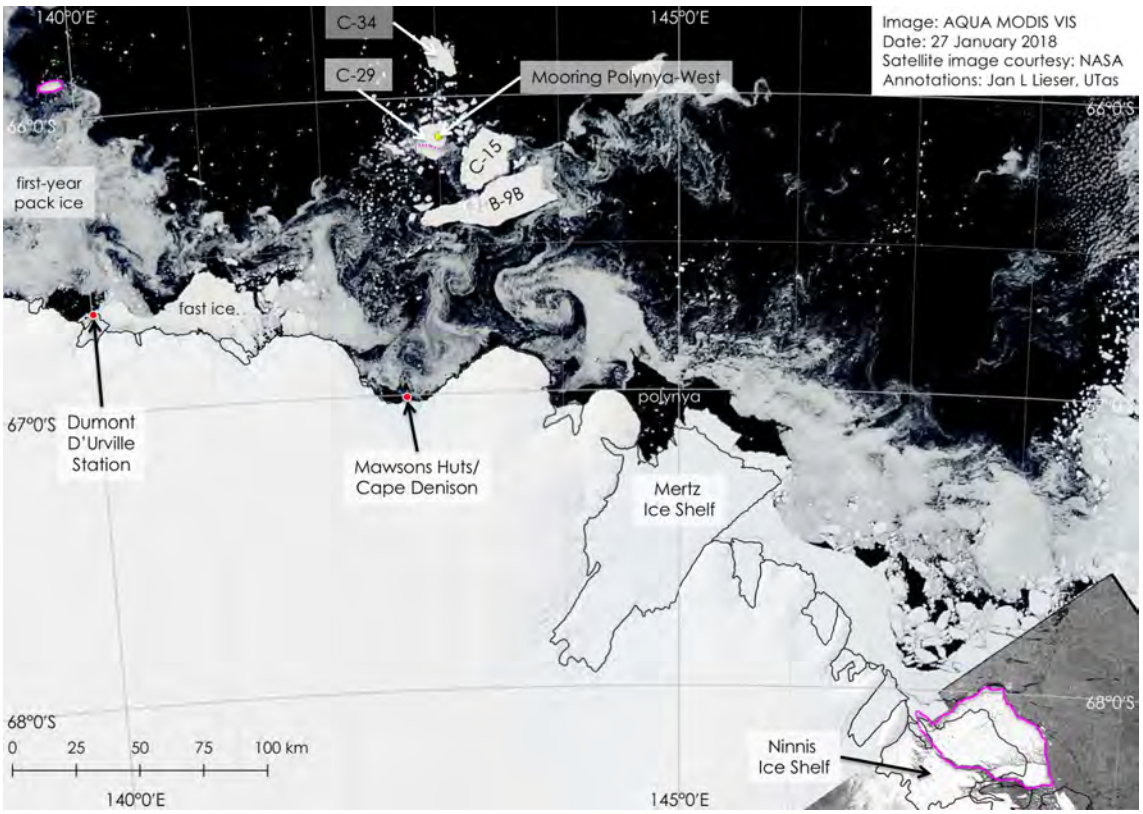

Figure 3: AQUA MODIS VIS scene acquired 27/01/2018 and provided by NASA; Sentinel-1b SAR IW scene acquired 27/01/2018 at 10:31 UT and provided by PolarView.

North of Cape Denison, the positions of four large, tabular icebergs are clearly seen. While iceberg B-9B and iceberg C-15 are still edging northward slightly, iceberg C-29 remains grounded and iceberg C-34 appears stuck as well. However, across the southern part of iceberg C-29 a new rift appeared and is indicated by the dashed, pink line.

In the southeastern corner of Figure 3, the SAR scene reveals that the northern part of Ninnis Ice Shelf appears ripe for calving, as there might only be a small fraction connected to the shelf on the western side. This will produce an iceberg of at least 1130 km^2 surface area.

Sea Ice Report #05.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
29/01/2018

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01.

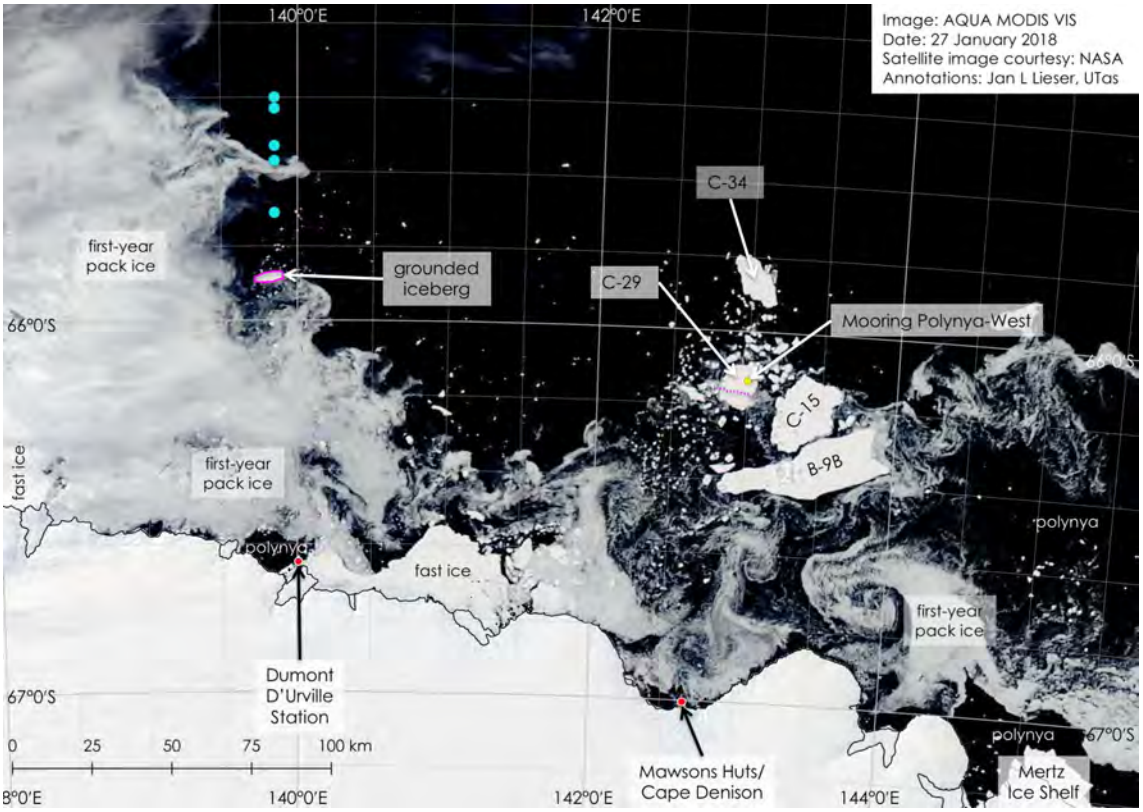

Figure 1: AQUA MODIS VIS scene acquired 27/01/2018 and provided by NASA.

The scene is almost completely unaffected by clouds. The positions of large icebergs can clearly be determined. At the southern end of the proposed stations just west of 140° E, a tongue of melting sea ice is seen reaching eastward from the west, through the proposed track. Many isolated smaller icebergs can also be seen in the area, showing as white dots on the black ocean.

North of Cape Denison, no fast ice is found between the large icebergs anymore. However, iceberg C-29 shows a new rift across its southern end

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(indicated by a dotted pink line), but it remains surrounded by many smaller icebergs. Icebergs B-9B and C-15 are still very slowly moving northward, but iceberg C-34 appears stuck.

Figure 2 shows a high-resolution SAR scene of Ninnis Ice Shelf.

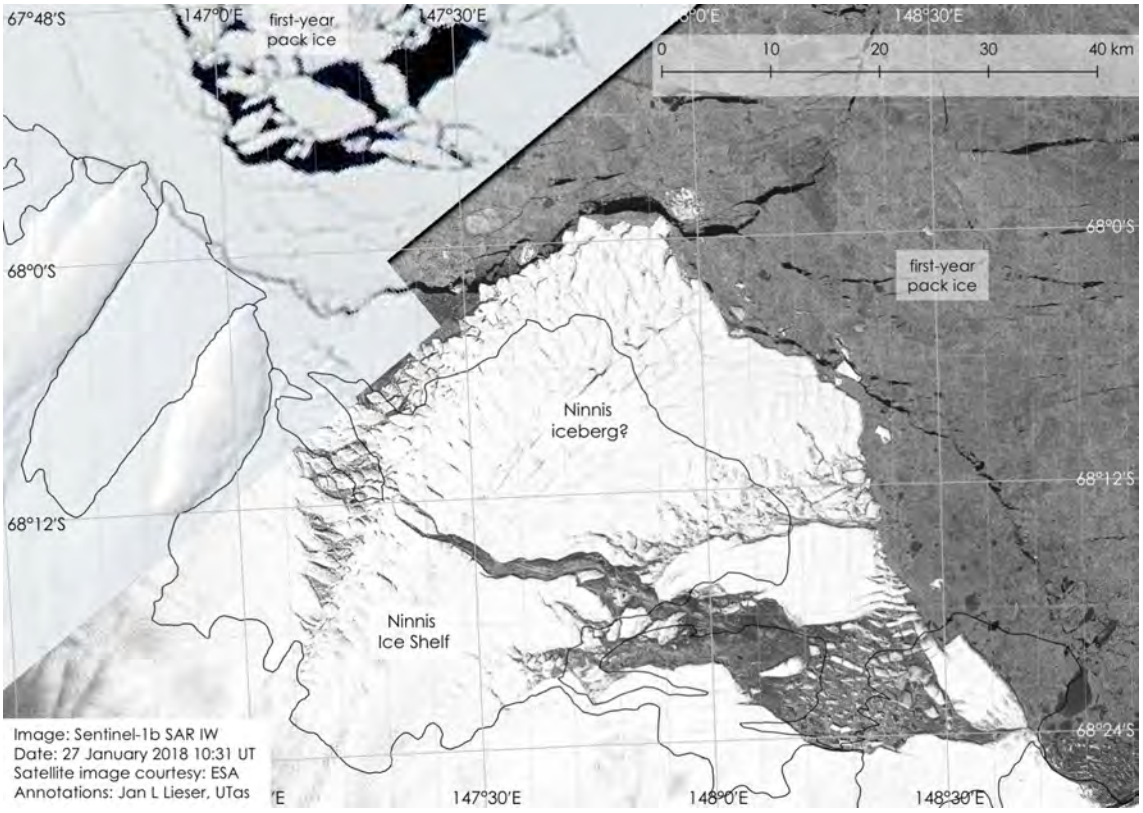

Figure 2: Sentinel-1b SAR IW scene acquired 27/01/2018 at 10:31 UT and provided by PolarView; complemented in the northwest by AQUA MODIS visible data acquired 27/01/2018 and provided by NASA.

The northern front of the shelf appears ripe for calving, as the area covered by the SAR shows an almost closed circumference and, only at the western edge, a small fraction might still be connected to the shelf. This will produce an iceberg of at least 1130 km^2 surface area.

Figure 3 shows a sea-ice concentration chart of larger D'Urville Sea region. Large, tabular icebergs are marked by pink dots and the cruise track of RV *Investigator* (up until 29/01/2018 02:30 UT) is seen as a white line and again light blue dots show proposed stations of the vessel's 2018 Voyage 01.

The above mentioned little tongue of melting sea ice crossing 140° E is below the detection limit of the sea-ice concentration algorithm. Generally, south of 64° S, some melting sea ice can reasonably be expected as isolated floes or small patches of floes.

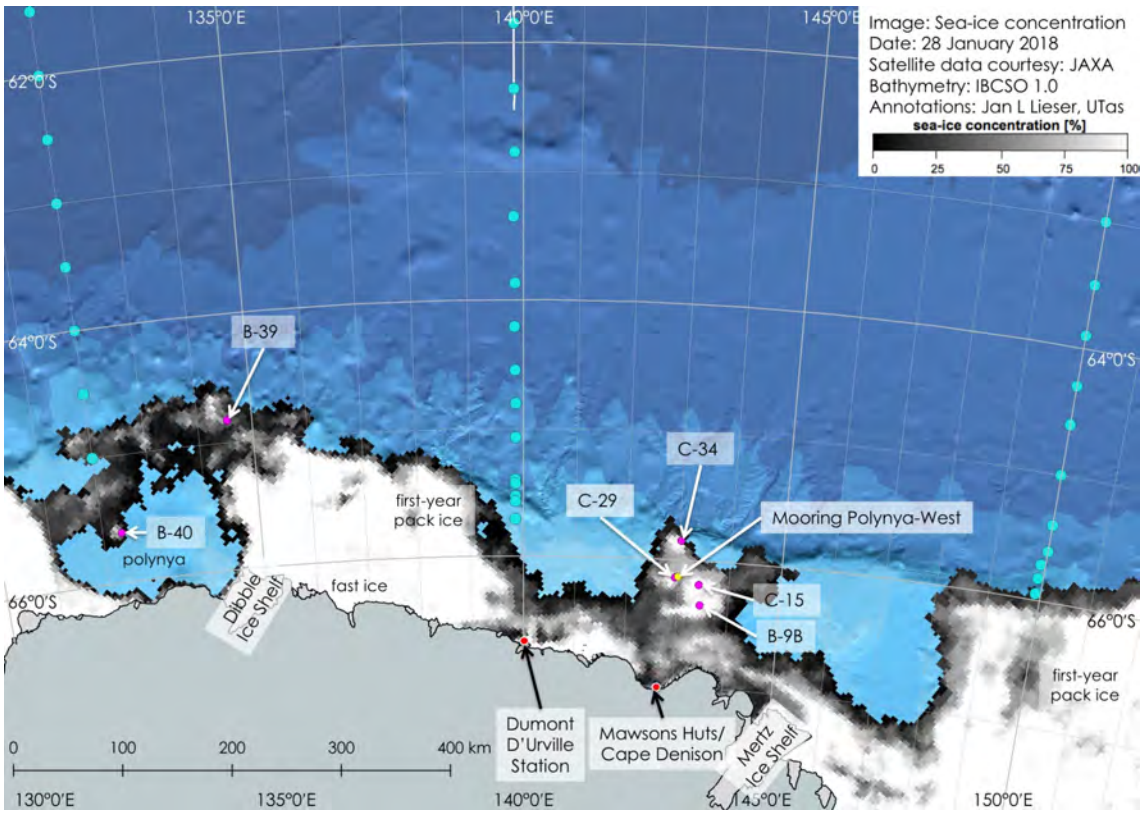

Figure 3: Sea-ice concentration data acquired 28/01/2018 and provided by Universität Hamburg.

Sea Ice Report #05.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
30/01/2018

Mawson Station

Figure 1 shows a high-resolution SAR scene off Mawson Station.

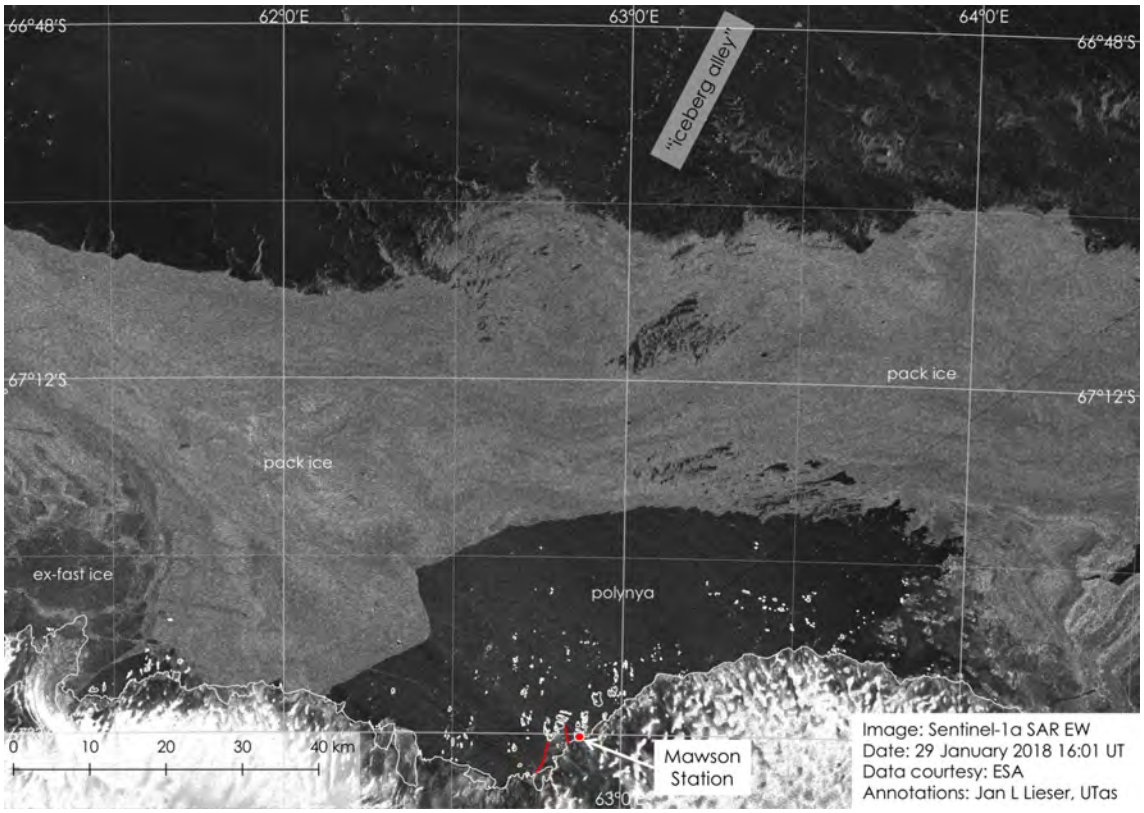

Figure 1: Sentinel-1a SAR EW data acquired 29/01/2018 at 14:30 UT and provided by PolarView.

Off Mawson Station, fast ice appears to have broken out, including out of Horseshoe Harbour. Only a small piece of fast ice remains south of the station between the coast and offshore islands.

North of the polynya off Mawson Station, a band of high-concentration pack ice (predominantly consisting small floes of melting ex-fast ice) is present.

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D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea. Positions of four large, tabular icebergs north of Cape Denison on 27/01/2018 are marked by dashed, pink outlines.

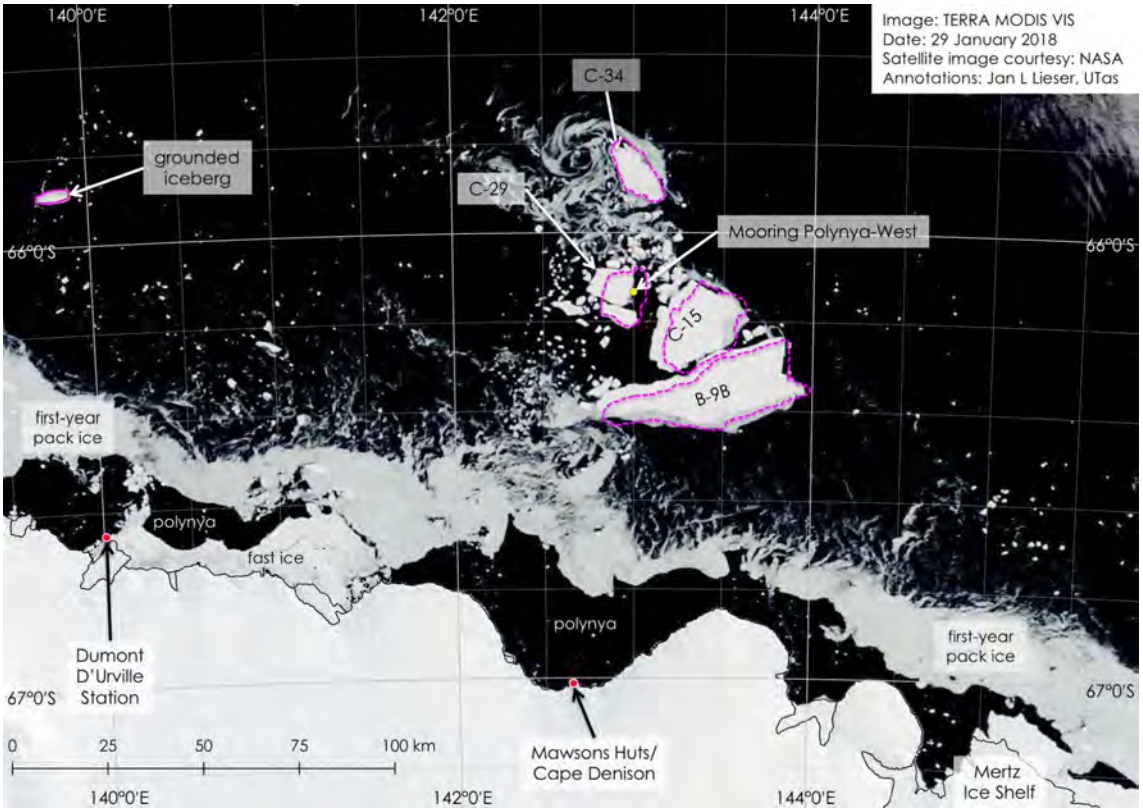

Figure 2: TERRA MODIS VIS scene acquired 29/01/2018 and provided by NASA.

Further to Sea Ice Report #5.1/2018, the rift noted cutting through iceberg C-29 has now split the berg and its northern part (85 km^2) has shifted roughly 4 km westward and therefore exposed the location of an oceanographic mooring (Polynya West, marked by a yellow dot). The smaller southern part of the iceberg (35 km^2) has moved only very little. After the split, the larger (northern) piece will retain the name C-29.

Sea Ice Report #05.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
30/01/2018

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01. Positions of four large, tabular icebergs north of Cape Denison on 27/01/2018 are marked by dashed, pink outlines.

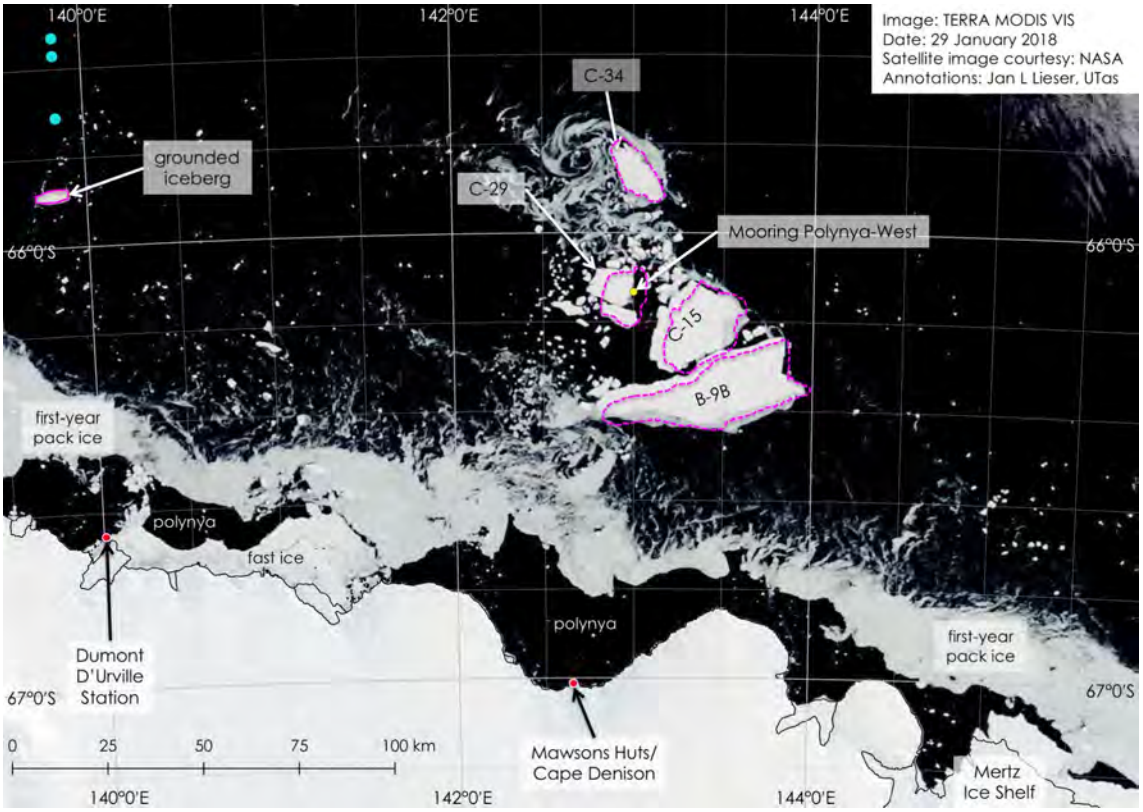

Figure 1: TERRA MODIS VIS scene acquired 29/01/2018 and provided by NASA.

Further to Sea Ice Report #5.2/2018, the rift noted cutting through iceberg C-29 has now split the berg and its northern part (85 km^2) has shifted roughly 4 km westward and therefore exposed the location of an oceanographic mooring (Polynya West, marked by a yellow dot). The smaller southern part of the iceberg (35 km^2) has moved only very little. After the split, the larger (northern) piece will retain the name C-29.

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Sea Ice Report #05.5/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
01/02/2018

Mawson Station

Figure 1 shows a high-resolution SAR scene of Mawson Coast. The orange line marks RSV *Aurora Australis*' cruise track up until 01/02/2018 00:30 UT.

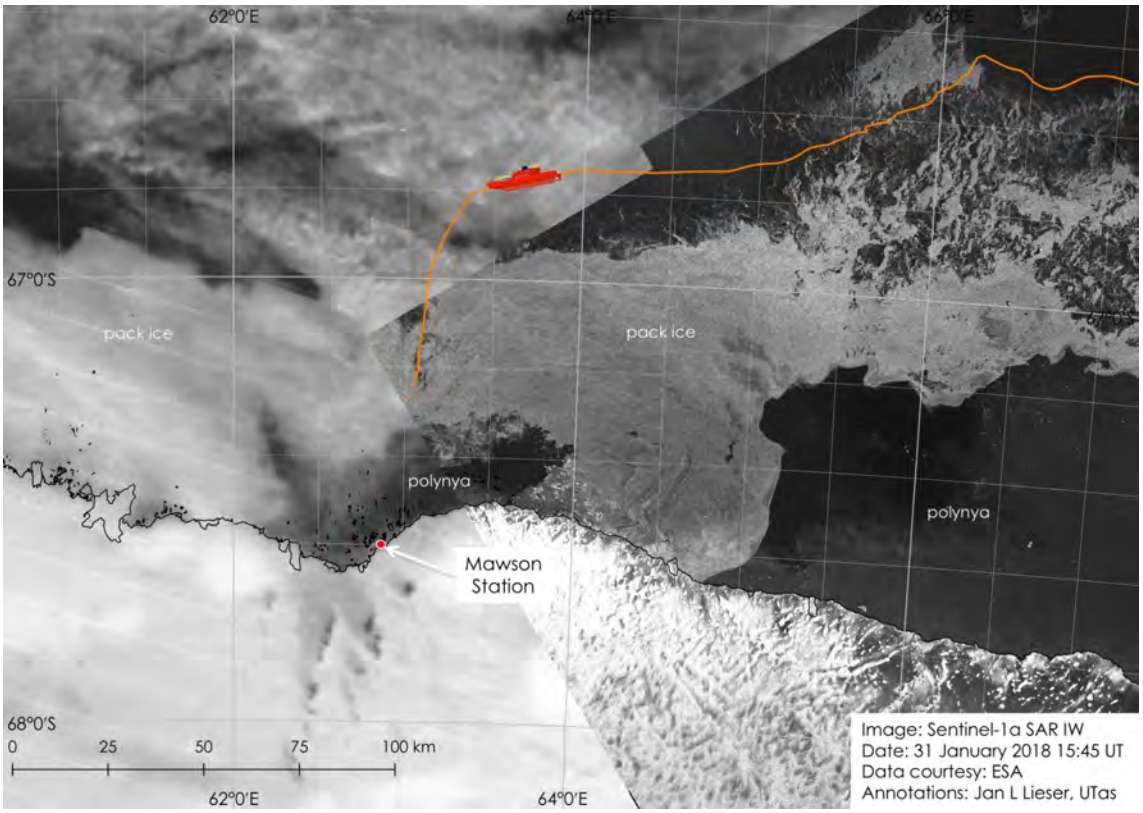

Figure 1: Sentinel-1a SAR IW scene acquired 31/01/2018 at 15:45 UT and provided by PolarView; complemented in the west by VIIRS DNB data, acquired 31/01/2018 and provided by NASA.

Off Mawson Station, the polynya is growing in size and the melange of first-year pack ice and ex-fast ice further north continues to decay. Due to a thin cloud cover obscuring the view of the ice surface in the DNB data, the extent of fast ice in that region cannot be determined.

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Casey Station

Figure 2 shows a SAR scene of Law Dome and surrounds. Colour-coded lines mark GMRT ocean bathymetry. Pink shapes mark the positions of large tabular icebergs.

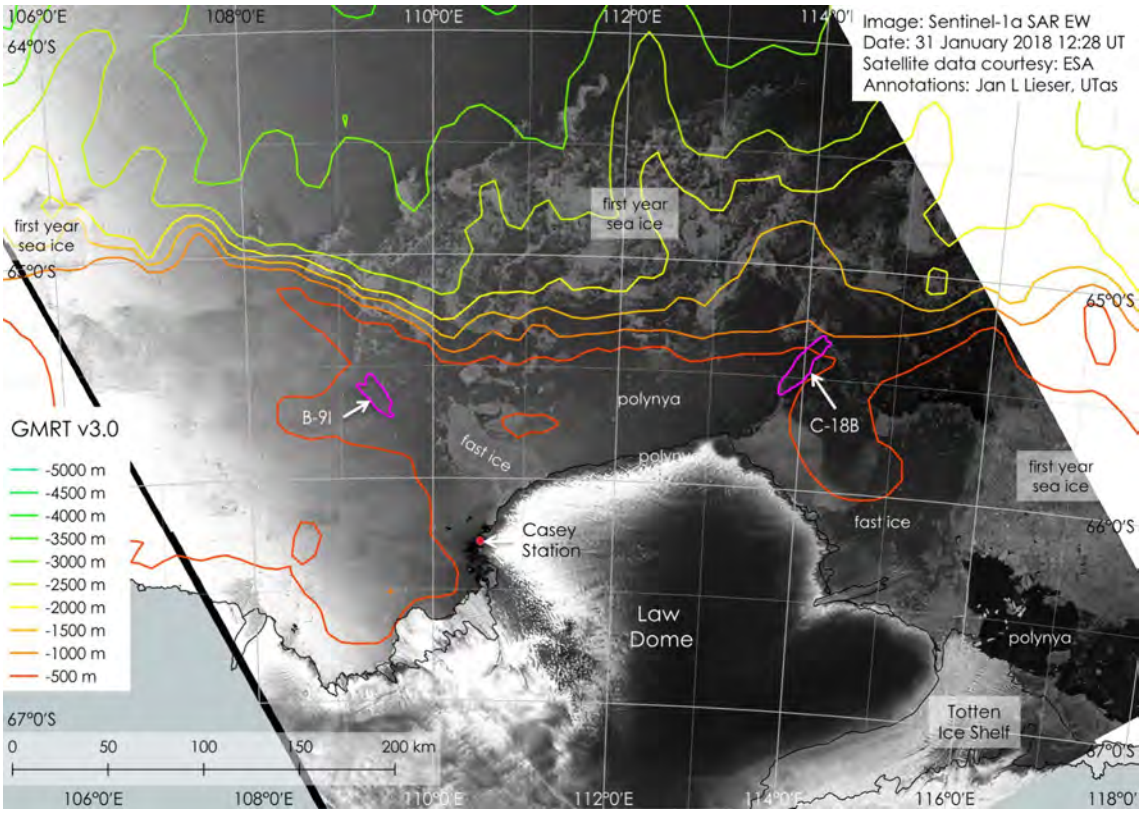

Figure 2: Sentinel-1a SAR EW scene acquired 31/01/2018 at 12:28 UT and provided by PolarView.

After its interaction with iceberg C-18B, iceberg B-9I has drifted westward, north of the 1000 m bathymetry (see Sea Ice Report #3.1/2018) but turned southward after crossing 110° E (see Sea Ice Report #5.1/2018). Depending on the actual depth of the iceberg, the 500 m bathymetry can act as a critical depth for grounding large tabular bergs, which is evident from the position and orientation of iceberg C-18B northeast of Law Dome.

Sea Ice Report #05.6/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
01/02/2018

D'Urville Sea

Figures 1 and 2 show a visible scene and a sea-ice concentration chart of D'Urville Sea, respectively. Light blue dots show proposed stations of RV *Investigator* 2018 Voyage 01, the cruise track of the vessel is marked by a white line (up until 01/02/2018 01:00 UT). Positions of four large, tabular icebergs north of Cape Denison are marked by dashed, pink outlines.

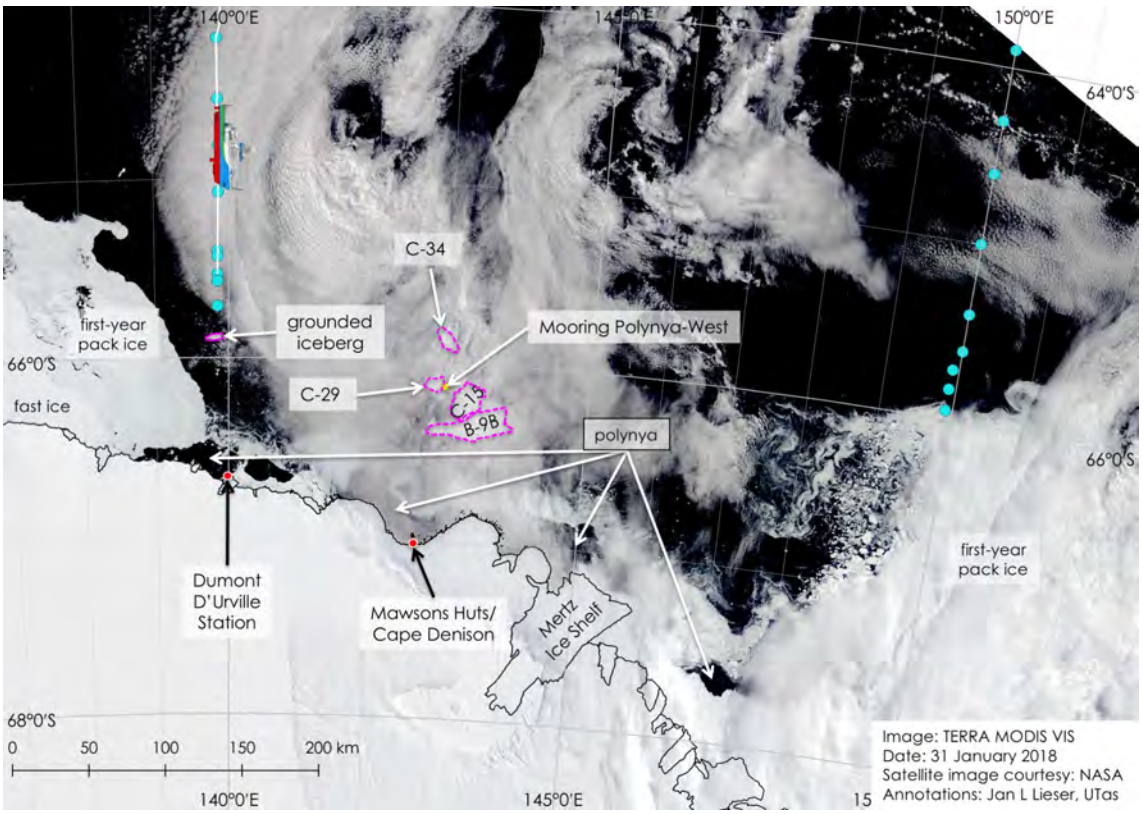

Figure 1: TERRA MODIS VIS scene acquired 31/01/2018 and provided by NASA.

Along 140° E, the southernmost proposed stations appear free of sea ice, however along 150° E, the southernmost one or two proposed stations might be affected by some small floes of sea ice.

Icebergs B-9B, C-15 and C-29 exhibit slight east-west movement, back and fourth by a few kilometres daily.

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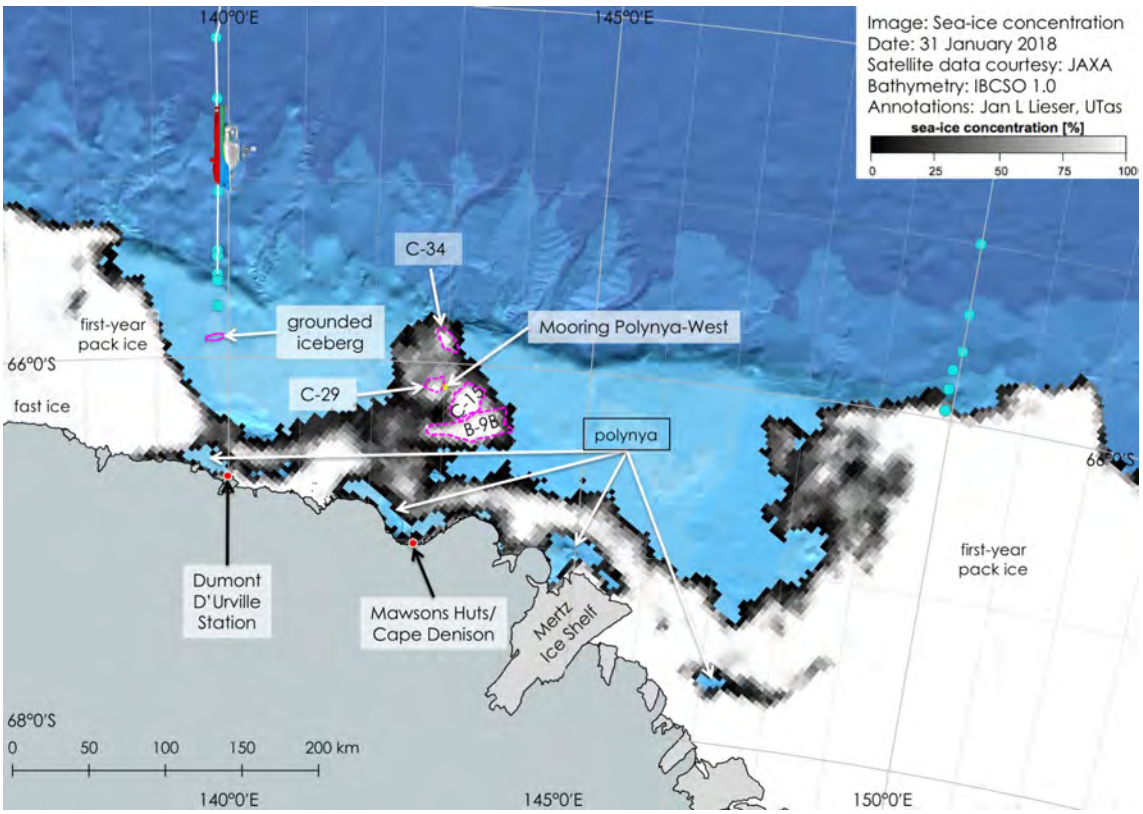

Figure 2: Sea-ice concentration chart acquired 31/01/2018 and provided by Universität Hamburg.

The presentation of low to medium sea-ice concentration around the group of icebergs north of Cape Denison is a display of a mixture of many smaller icebergs surrounded by some iceberg debris and remnant sea ice as analysed by the algorithm processing the original microwave data.

Sea Ice Report #05.7/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
02/02/2018

D'Urville Sea

Figure 1 shows a visible and SAR data composite of D'Urville Sea. Light blue dots mark proposed stations of RV *Investigator* 2018 Voyage 01, the cruise track of the vessel is given by a blue line (up until 01/02/2018 22:15 UT).

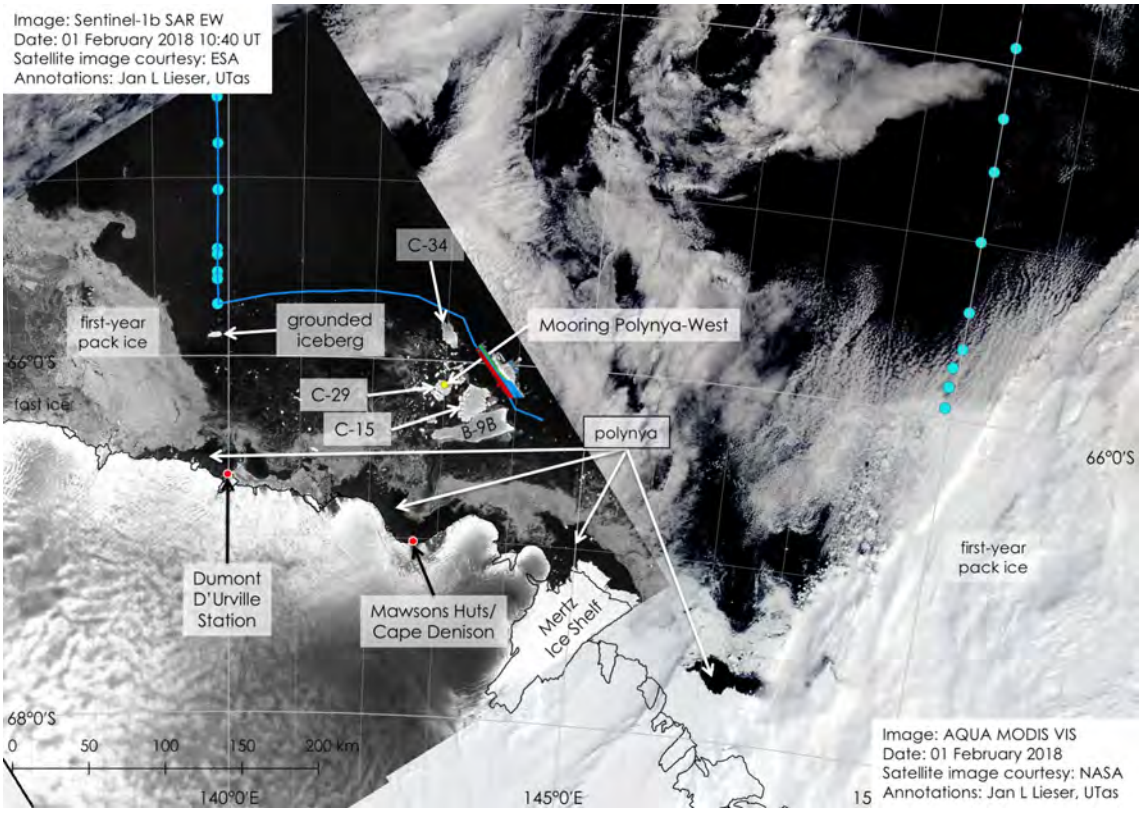

Figure 1: AQUA MODIS VIS scene acquired 01/02/2018 and provided by NASA; overlay of Sentinel-1b SAR EW acquired 01/02/2018 at 10:40 UT and provided by PolarView.

Along 150° E, the southernmost one or two proposed stations appear still affected by some sea ice, but the exact location of the sea-ice edge is obscured by clouds.

North of Cape Denison, iceberg C-29 has temporarily moved back over the location of an oceanographic mooring (yellow dot).

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Sea Ice Report #06.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
05/02/2018

Mawson Station

Figure 1 shows a visible scene of Mawson Coast and offshore, which is largely obscured by thin clouds. The orange line marks the cruise track of RSV *Aurora Australis* (up until 05/02/2018 01:00 UT).

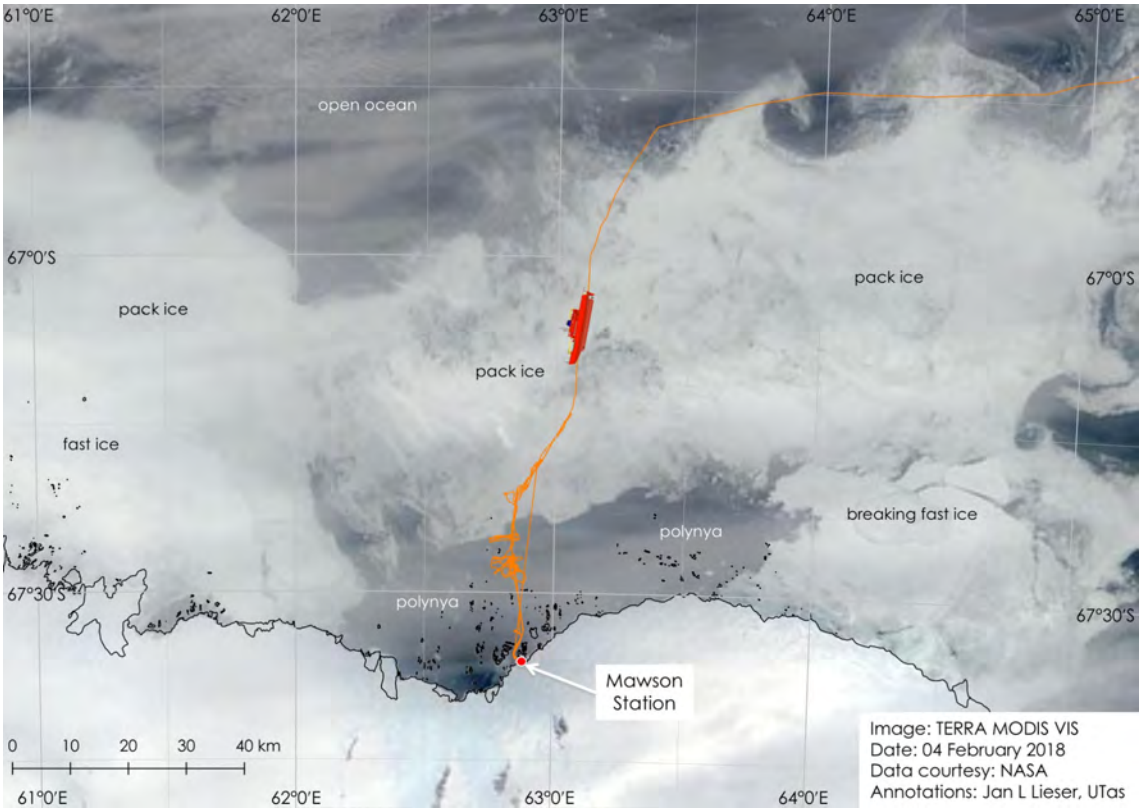

Figure 1: TERRA MODIS VIS scene acquired 04/02/2018 and provided by NASA.

Off Mawson Station, the polynya is separated from the open ocean in the north by a band of ex-fast ice and first-year sea ice. Between 62° E and 64° E, this band shows locally reducing sea-ice concentration. At its northern edge, some formations of sea ice suggest local redistribution of sea ice by small-scale ocean surface eddies (for example just west of 64° E).

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Cooperation Sea

Figure 2 shows a SAR scene of the D-15 icebergs north of the West Ice Shelf.

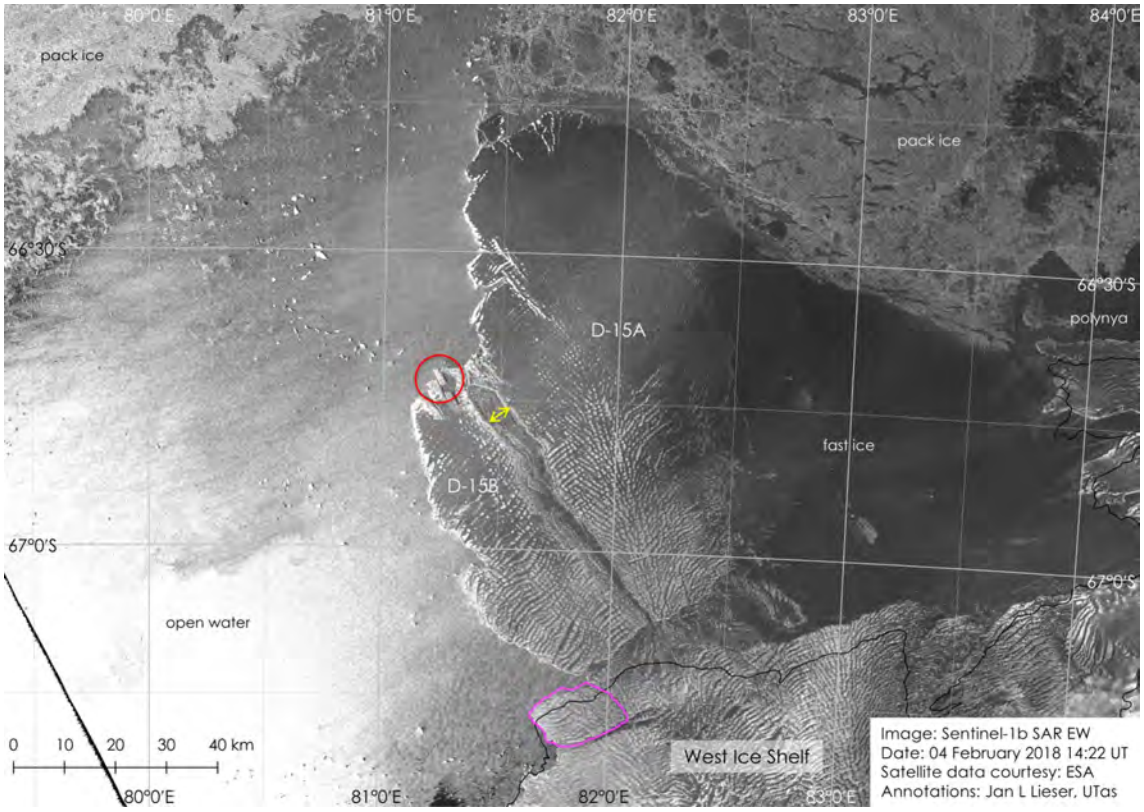

Figure 2: Sentinel-1b SAR EW acquired 04/02/2018 at 14:22 UT and provided by PolarView.

D-15B appears to be on the move ever so slowly, while the rift between it and D-15A measures now 4.6 km (see also Sea Ice Report #5.1/2018) at its northern end (yellow double-arrow). Smaller icebergs are also spawning off the northern edge of D-15B. An example is marked by the red circle (roughly 4 km^2).

At the western edge of the West Ice Shelf, a large piece of shelf seems to have completed its separation from the shelf (pink shape) and therefore created a yet-to-be-named iceberg of approximately 150 km^2.

D'Urville Sea

Figure 3 shows a visible scene of D'Urville Sea. Positions of various icebergs and the location of the northern sea-ice edge of coastal polynyas on 29/01/2018 are marked by dashed, pink lines and a dashed, yellow line, respectively.

North of Cape Denison, all of the marked icebergs (except for iceberg C-34) are moving slightly in predominantly east-west directions. Even the southern fragment of iceberg C-29 is now rotating slightly.

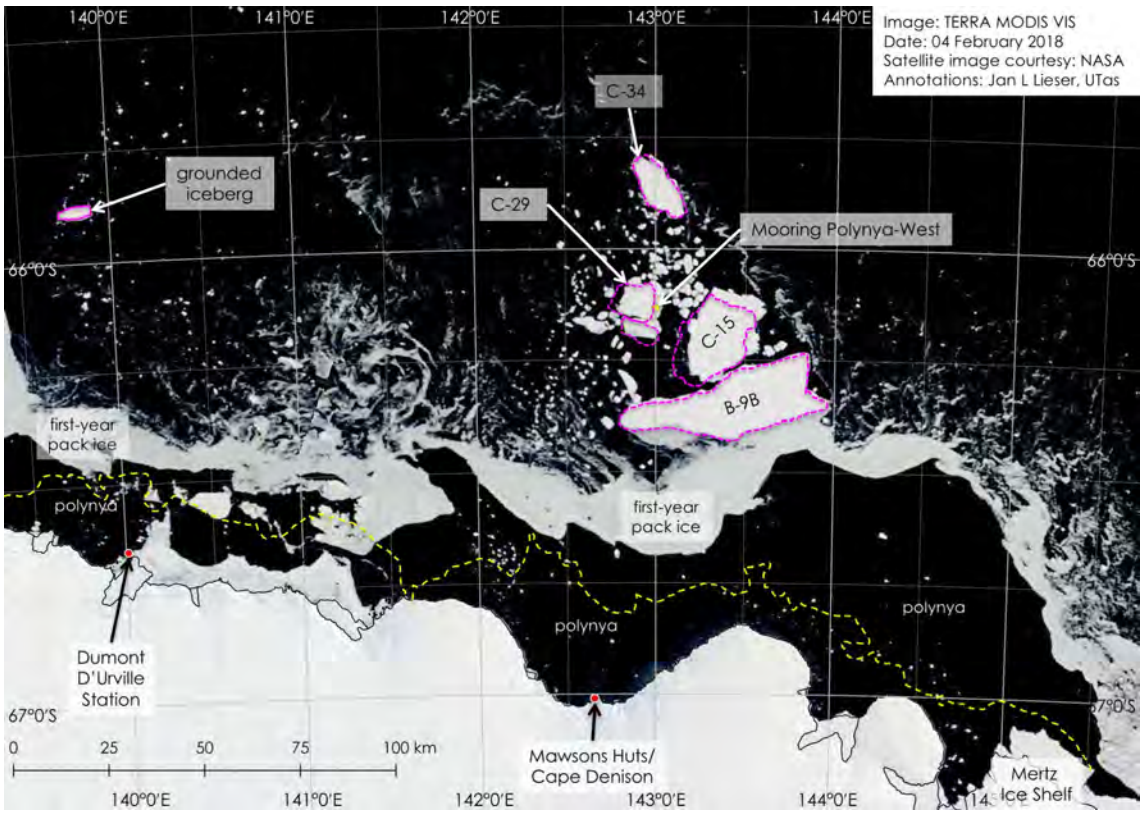

Figure 3: TERRA MODIS VIS scene acquired 04/02/2018 and provided by NASA.

Since 29/01/2018, recent southerly winds have pushed offshore sea ice considerably northward and created many strips and patches of sea ice extending north from the pack-ice edge.

Sea Ice Report #06.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
05/02/2018

D'Urville Sea

Figure 1 shows a visible scene of D'Urville Sea. Light blue dots mark proposed stations of RV *Investigator* 2018 Voyage 01, the cruise track of the vessel is given by a blue line (up until 05/02/2018 04:00 UT). Off Cape Denison and the Mertz Ice Shelf, a dashed, yellow line marks the northern edge of a coastal polynya on 29/01/2018.

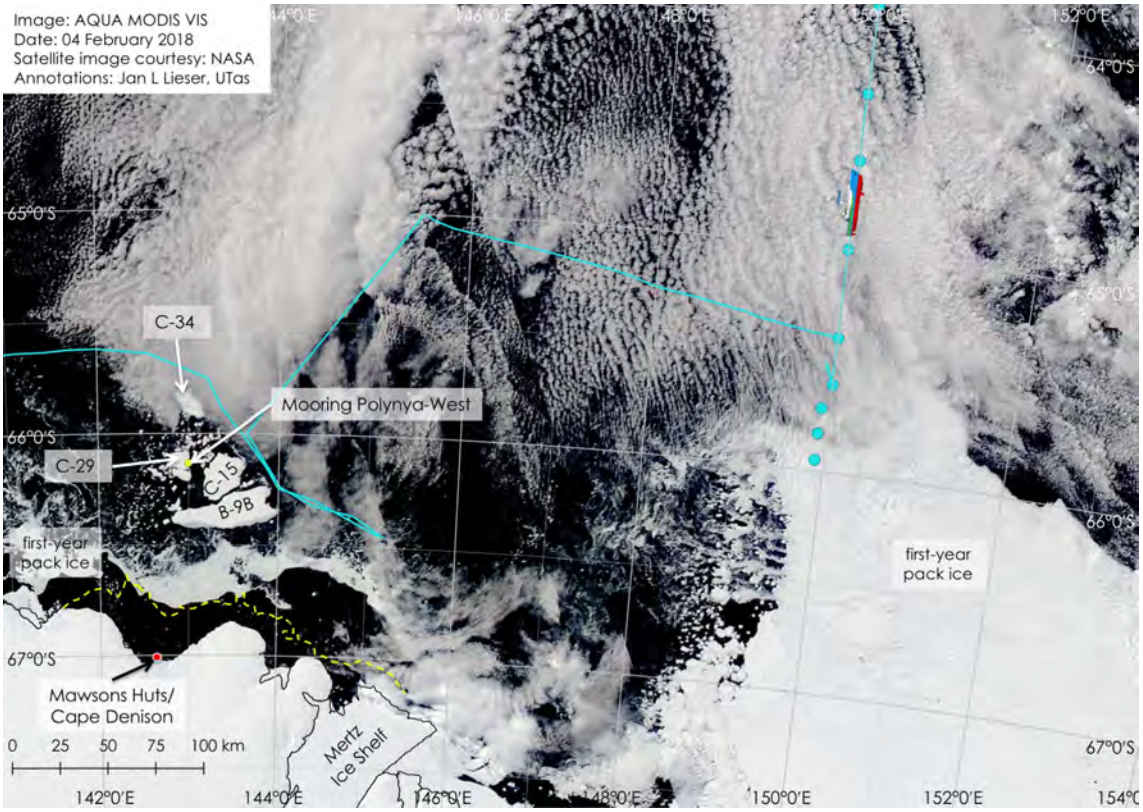

Figure 1: AQUA MODIS VIS scene acquired 04/02/2018 and provided by NASA.

Recent southerly winds have moved sea ice considerably northward and created many strips and patches of sea ice at the northern edge of the pack ice. Along 150° E, this fuzzy sea-ice edge is obscured by clouds, but the cloud formation suggests a continued cold air outflow from the south.

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Sea Ice Report #06.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
06/02/2018

D'Urville Sea

Figure 1 shows a sea-ice concentration chart of D'Urville Sea. Light blue dots mark proposed stations of RV *Investigator* 2018 Voyage 01, the cruise track of the vessel is given by a blue line (up until 06/02/2018 04:00 UT).

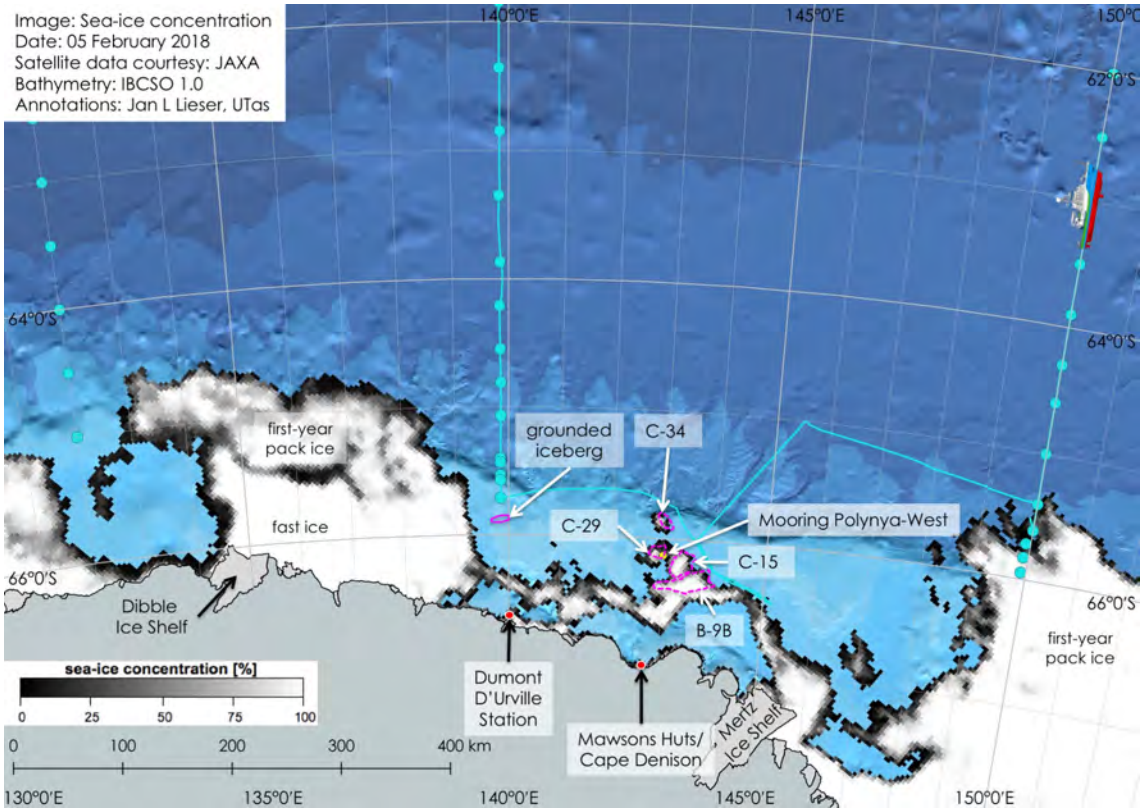

Figure 1: Sea-ice concentration data acquired 05/02/2018 and provided by Universität Hamburg.

Along 133° E, the southernmost, proposed stations appear currently free of sea ice in the sea-ice concentration chart. However, forecast strong easterlies in the area have the potential of moving first-year pack ice north of the Dibble Ice Shelf westward, before decreasing and northerly shifting winds (expected around midday UT on 08/02/2018) can push the sea-ice edge southward again. Generally south of 64° S, presence of some sea ice can reasonably be expected in the region.

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Sea Ice Report #06.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
08/02/2018

Mawson Coast

Figure 1 shows a SAR scene of Mawson Coast and offshore. The cruise track of RSV *Aurora Australis* is given by an orange line (up until 08/02/2018 00:00 UT).

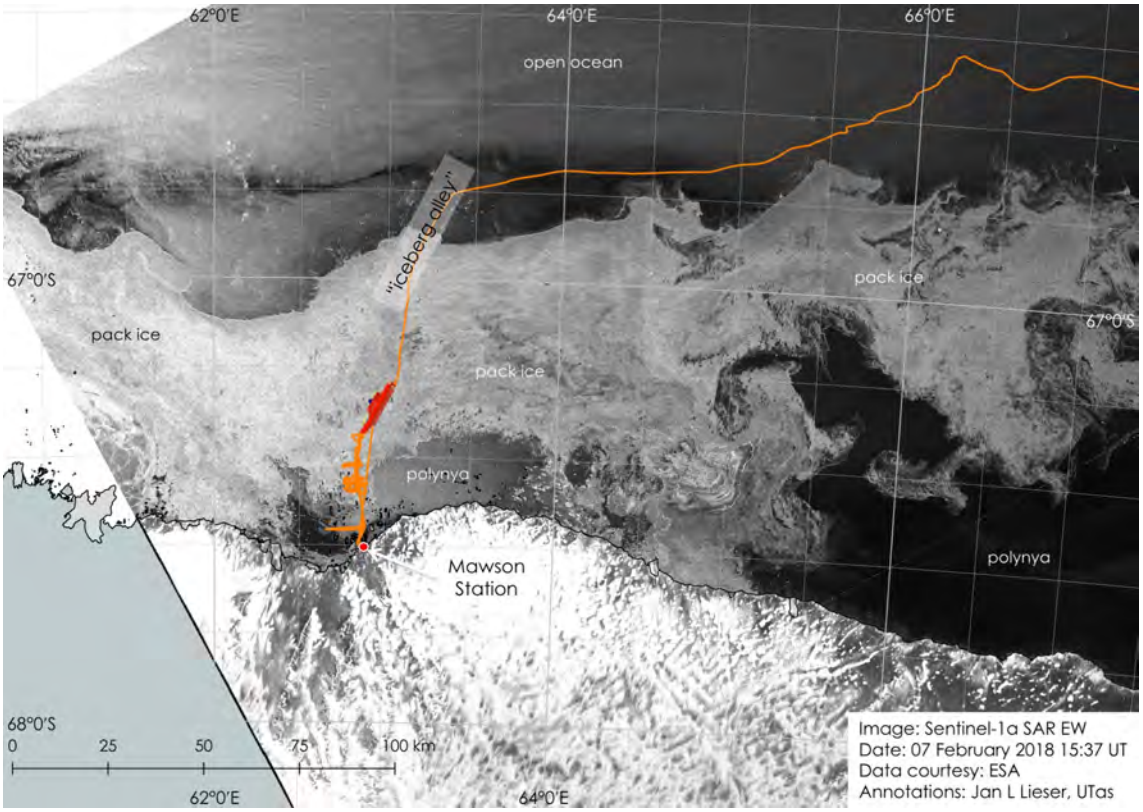

Figure 1: Sentinel-1a SAR EW data acquired 07/02/2018 at 15:37 UT and provided by PolarView.

The passing of recent weather systems north of the sea-ice edge has compacted the edge and generally moved the pack ice southward, while compacting the pack slightly. Off Mawson Station, the polynya has shrunk in size and is showing a fuzzy northern boundary.

On the coast around 64° E and further east off Cape Darnley (not shown in the figure), fast ice continues to break up.

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Sea Ice Report #06.5/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
09/02/2018

D'Urville Sea

Figure 1 shows a sea-ice concentration and SAR composite of D'Urville Sea. Light blue dots mark proposed stations of RV *Investigator* 2018 Voyage 01.

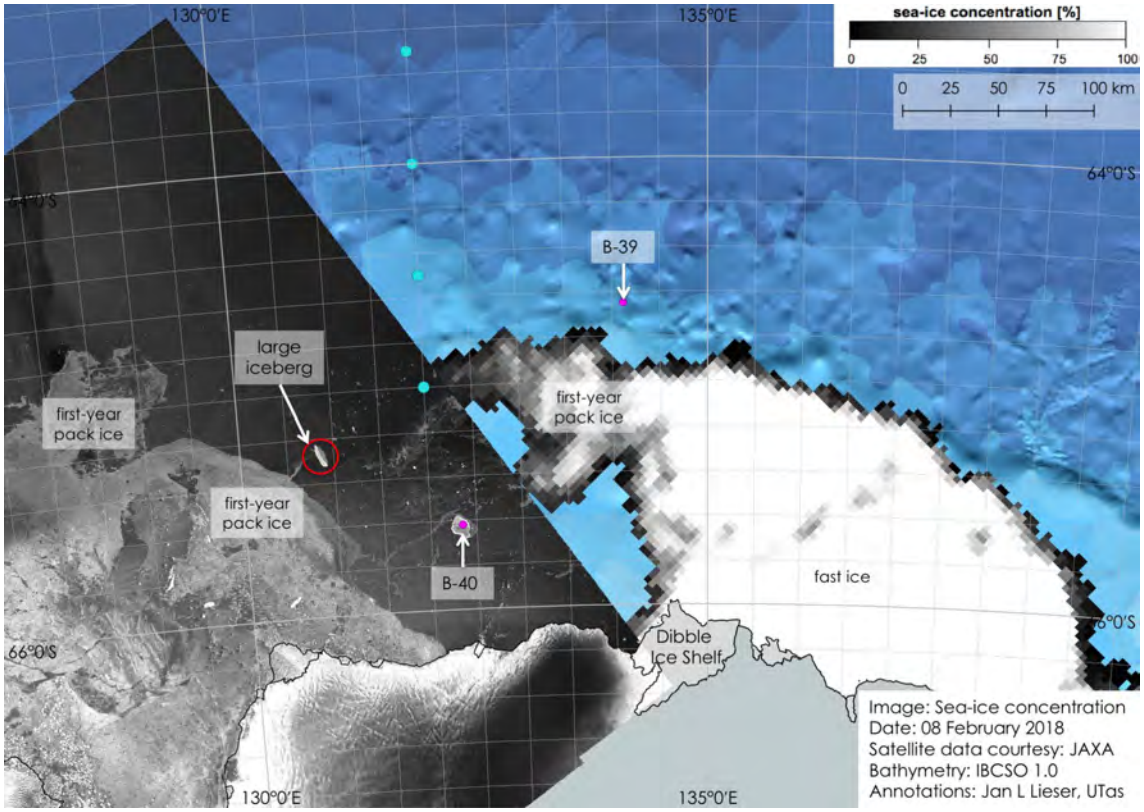

Figure 1: Sea-ice concentration data acquired 08/02/2018 and provided by Universität Hamburg; overlay of Sentinel-1a SAR EW acquired 08/02/2018 at 11:22 UT, and provided by PolarView.

Along 133° E, the southernmost, proposed station appears currently affected by little sea ice in the sea-ice concentration chart and the high-resolution SAR scene shows the presence of icebergs, and strips and patches of sea ice in the area.

Generally south of 64° S, icebergs (two large, tabular icebergs are marked by pink dots in the figure), iceberg fragments and some sea ice can reasonably be expected in the region.

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Sea Ice Report #06.6/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
09/02/2018

Ross Sea

Figure 1 shows a sea-ice concentration and SAR composite of Ross Sea. Blue dots mark proposed stations of RV *Tangaroa* 2018 Voyage 02.

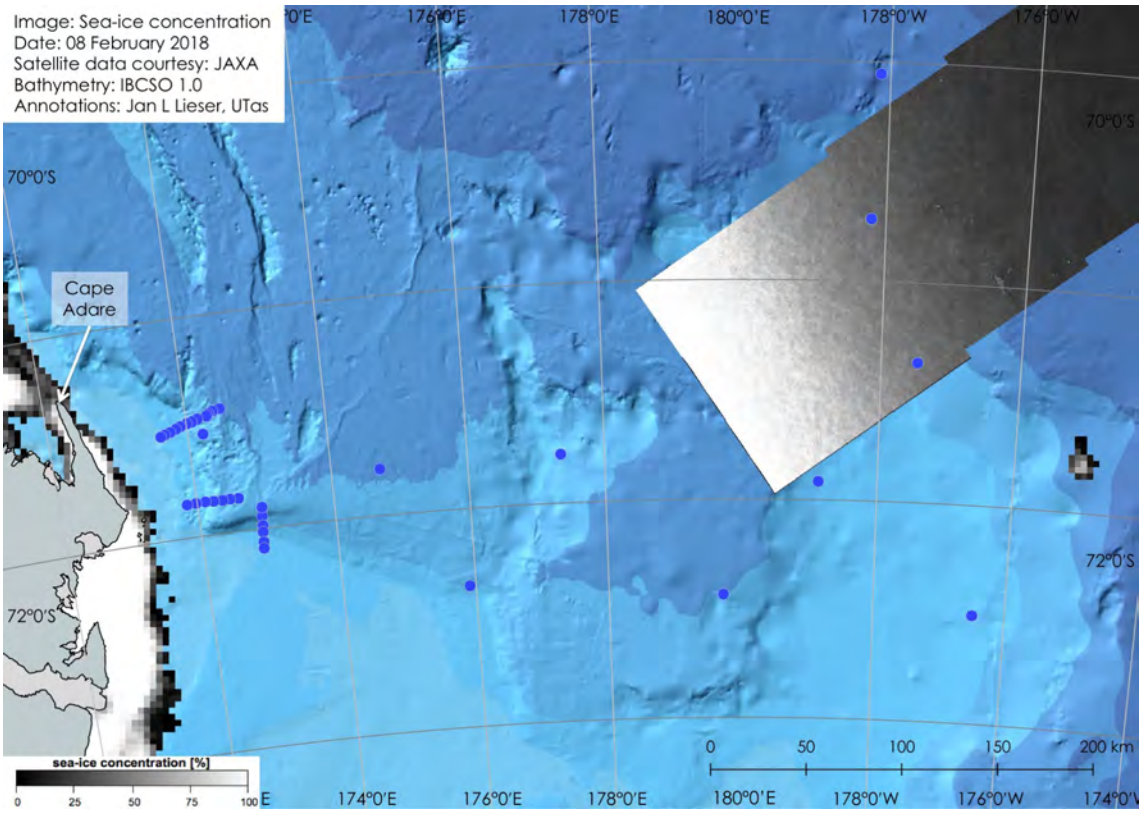

Figure 1: Sea-ice concentration data acquired 08/02/2018 and provided by Universität Hamburg; overlay of Sentinel-1b SAR EW acquired 07/02/2018 at 08:11 UT, and provided by PolarView.

The region shown in the figure appears generally free of sea ice, except near shore, where fast ice remains attached to the coast and some melting sea ice and ex-fast ice, which is breaking off the fast-ice edge, is drifting north- and westward around Cape Adare. The SAR scene in the upper-right corner of Figure 1 shows the presence of isolated icebergs and strips and patches of sea ice east of proposed stations (for example at 176° 22' W and 70° 58' S).

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Figure 2 shows a visible scene of Cape Adare and offshore. Blue dots mark proposed stations of RV *Tangaroa* 2018 Voyage 02.

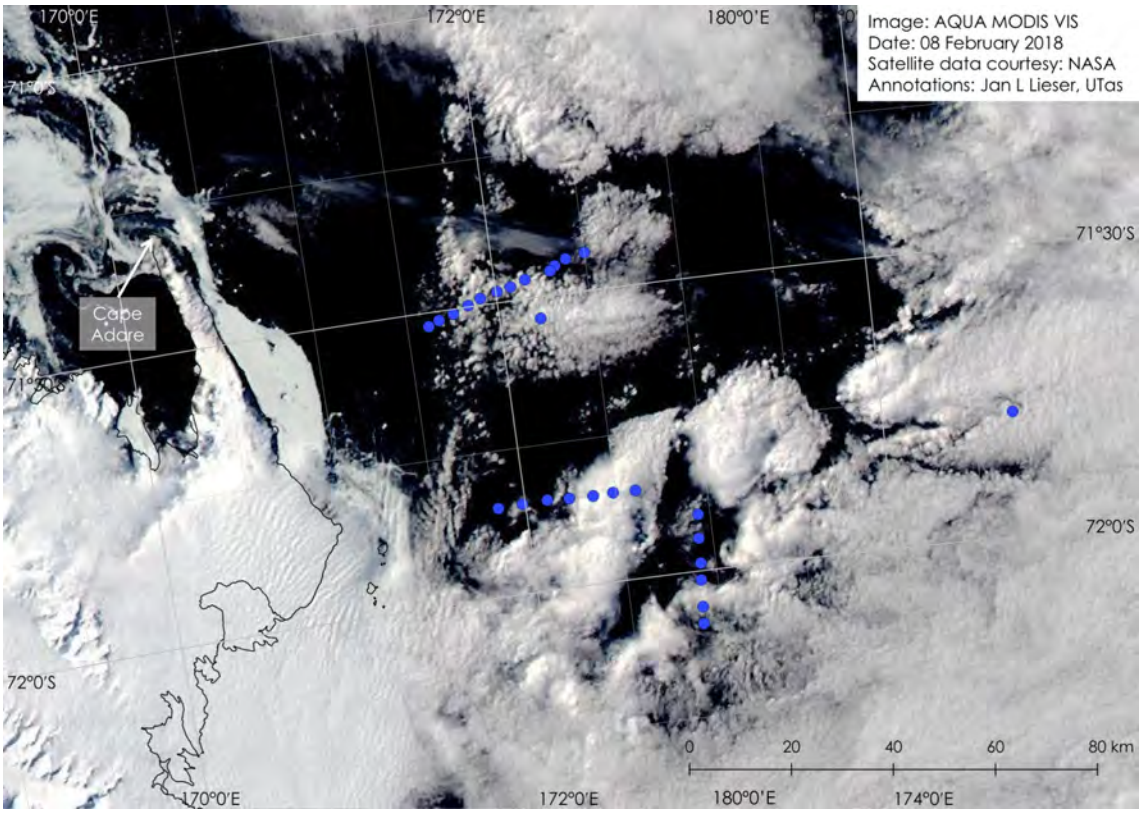

Figure 2: AQUA MODIS visible data acquired 08/02/2018 and provided by NASA.

Around Cape Adare, sea ice can be seen drifting near shore with a clearly defined sea-ice edge south of the cape and the fuzzy sea-ice edge further north and west. The rest of the scene is largely affected by clouds.

Generally south of 70° S, icebergs, iceberg fragments, and strips and patches of sea ice can reasonably be expected in the region.

Sea Ice Report #07.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
13/02/2018

D'Urville Sea

Figure 1 shows a sea-ice concentration chart of D'Urville Sea. Light blue dots mark proposed stations of RV *Investigator* 2018 Voyage 01, the cruise track of the vessel is given by a blue line (up until 13/02/2018 00:00 UT). The sea-ice edge on 11/02/2018 is marked as an orange line.

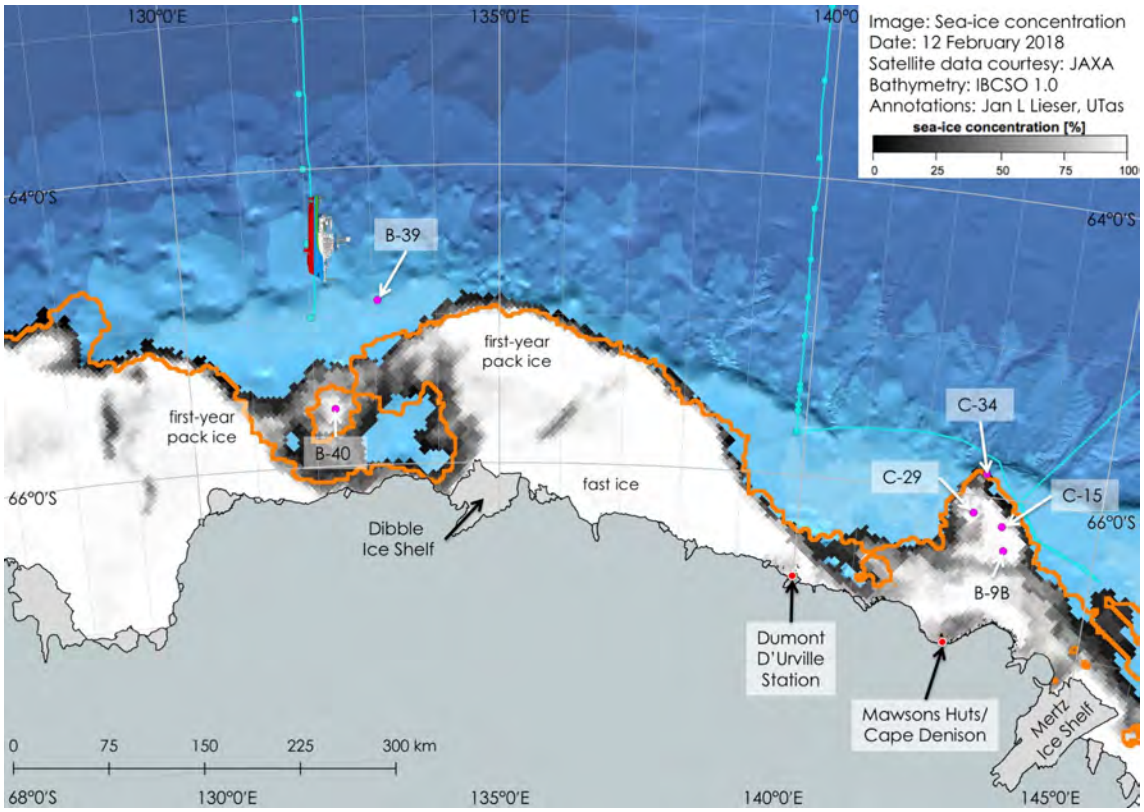

Figure 1: Sea-ice concentration data acquired 12/02/2018 and provided by Universität Hamburg.

Along 133° E, the southernmost, proposed stations appear clear of sea ice in the sea-ice concentration chart.

Generally south of 64° S, presence of some sea ice, icebergs and iceberg fragments can reasonably be expected in the region.

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Sea Ice Report #07.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
13/02/2018

Ross Sea

Figure 1 shows a sea-ice concentration chart of Ross Sea. Yellow dots mark proposed stations of RV *Tangaroa* 2018 Voyage 02. An orange line marks the sea-ice edge on 11/02/2018.

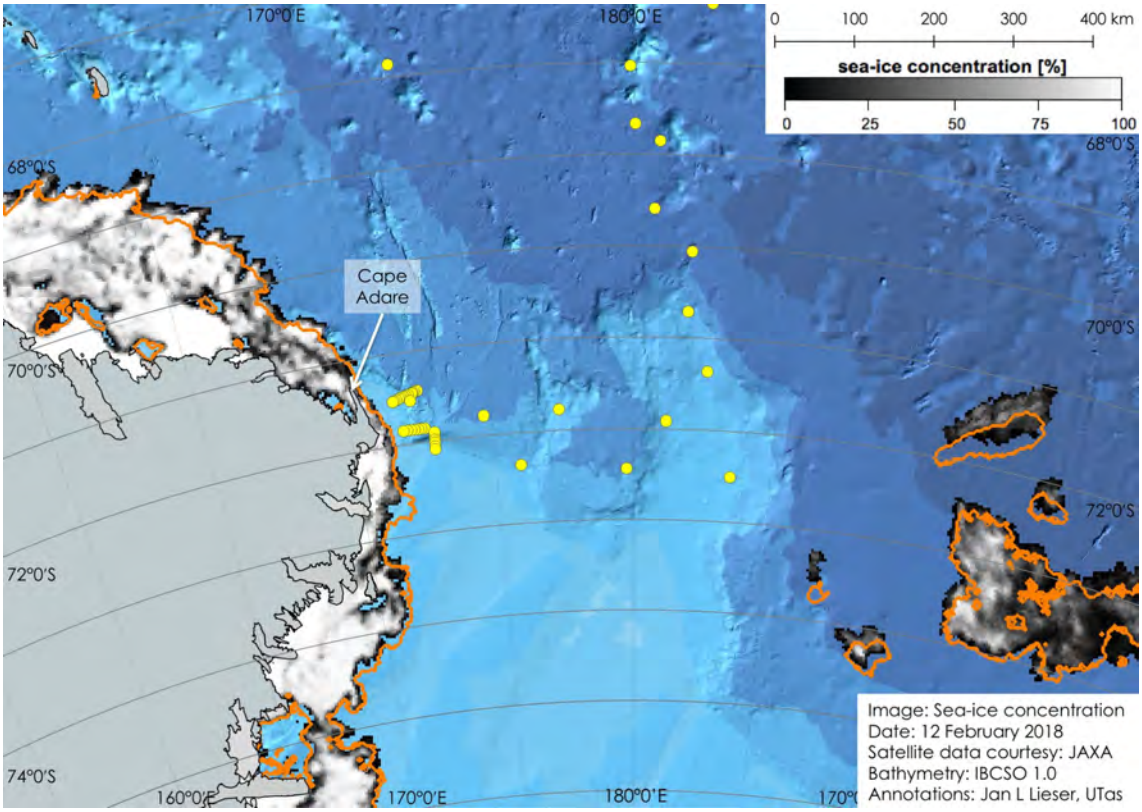

Figure 1: Sea-ice concentration data acquired 12/02/2018 and provided by Universität Hamburg.

The region of proposed operations appears generally free of sea ice, except near shore, where fast ice remains attached to the coast and some melting sea ice and ex-fast ice, which is breaking off the fast-ice edge, is drifting north- and westward around Cape Adare.

Figure 2 shows a high-resolution SAR scene of Cape Adare and offshore. Yellow dots mark proposed stations of RV *Tangaroa* 2018 Voyage 02.

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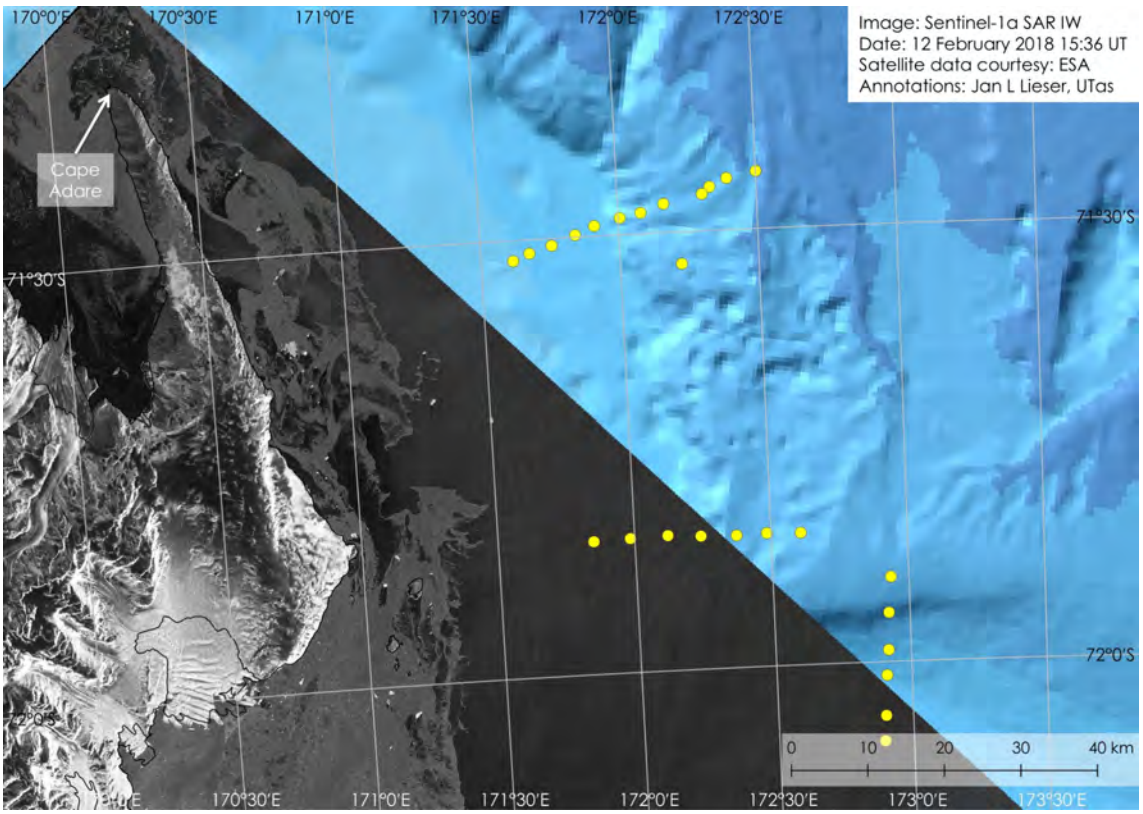

Figure 2: Sentinel-1a SAR IW data acquired 12/02/2018 at 15:36 UT and provided by PolarView.

Around Cape Adare, the presence of loose sea ice appears confined to roughly 10 nautical miles offshore but some icebergs show also as bright spots in the SAR.

Generally south of 70° S, icebergs, iceberg fragments, and strips and patches of sea ice can reasonably be expected in the region.

Sea Ice Report #07.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
14/02/2018

Casey Station

Figure 1 shows a visible scene of Law Dome and vicinity.

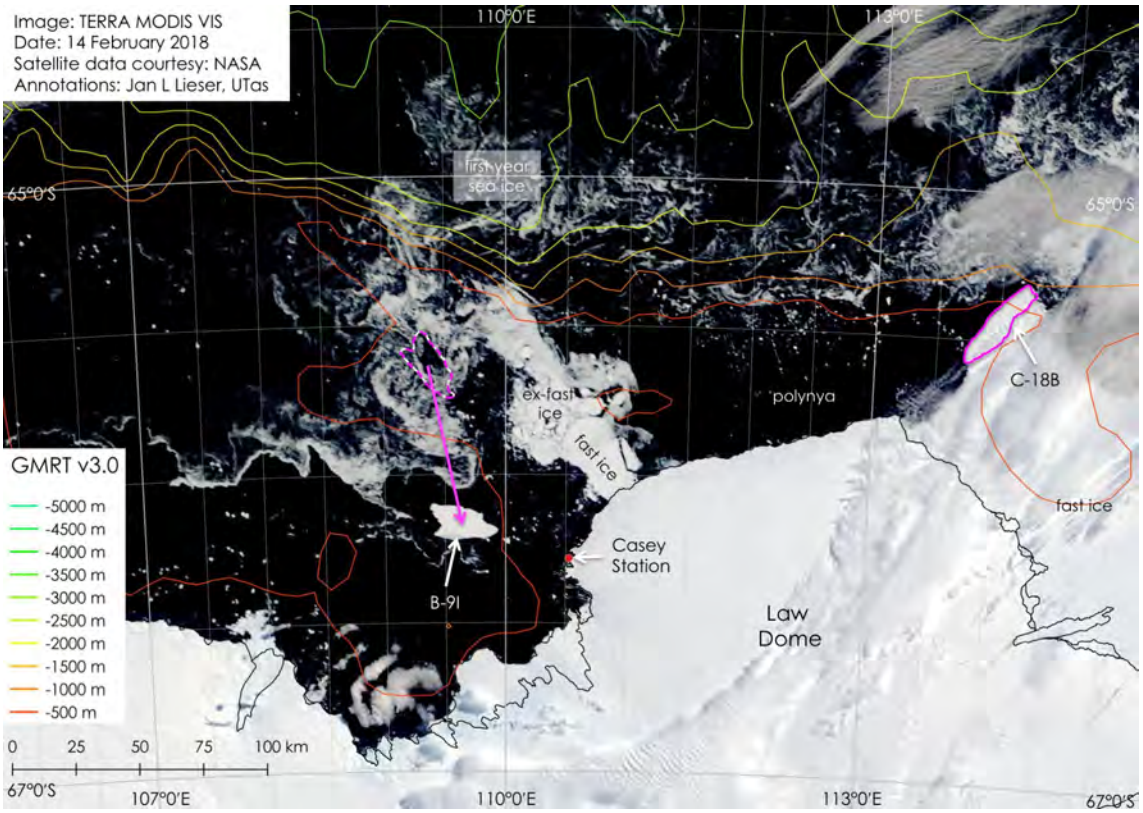

Figure 1: TERRA MODIS VIS scene acquired 14/02/2018 and provided by NASA.

North of Casey Station, fast ice continues to break up and fragments of it are drifting westward as strips and patches of sea ice.

Since 31/01/2018 (position indicated by the pink, dashed shape), iceberg B-9I has drifted southward more than 34 nautical miles towards Vincennes Bay (pink arrow in Figure 1), but sits currently in water depth of more than 500 m.

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D'Urville Sea

Figure 2 shows a high-resolution SAR scene of Cape Denison and offshore.

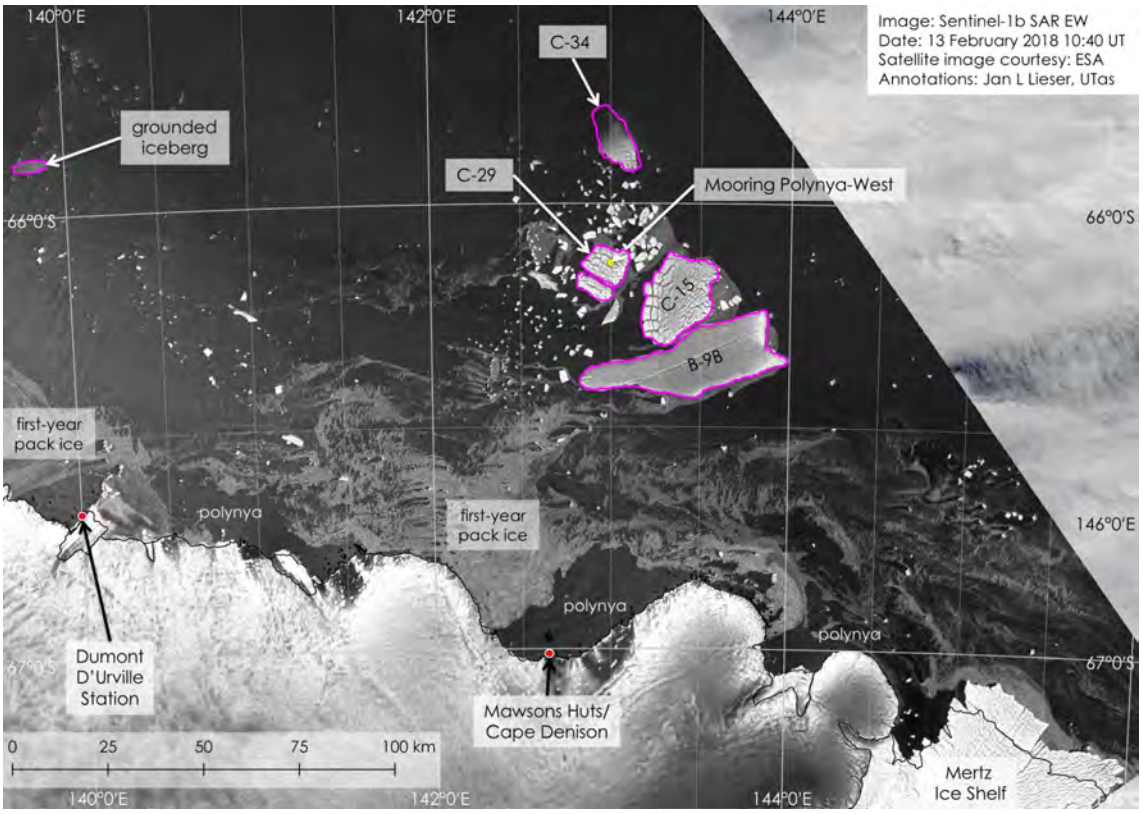

Figure 2: Sentinel-1b SAR EW data acquired 13/02/2018 at 10:40 UT and provided by PolarView.

Since 04/02/2018, icebergs B-9B, C-15 and C-29 have shifted slightly southwestward (see Sea Ice Report #06.1/2018). Many smaller, grounded icebergs, which are surrounding the group of large bergs, are preventing more substantial movements of the large icebergs at the moment.

Sea Ice Report #07.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
15/02/2018

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for January 2018.

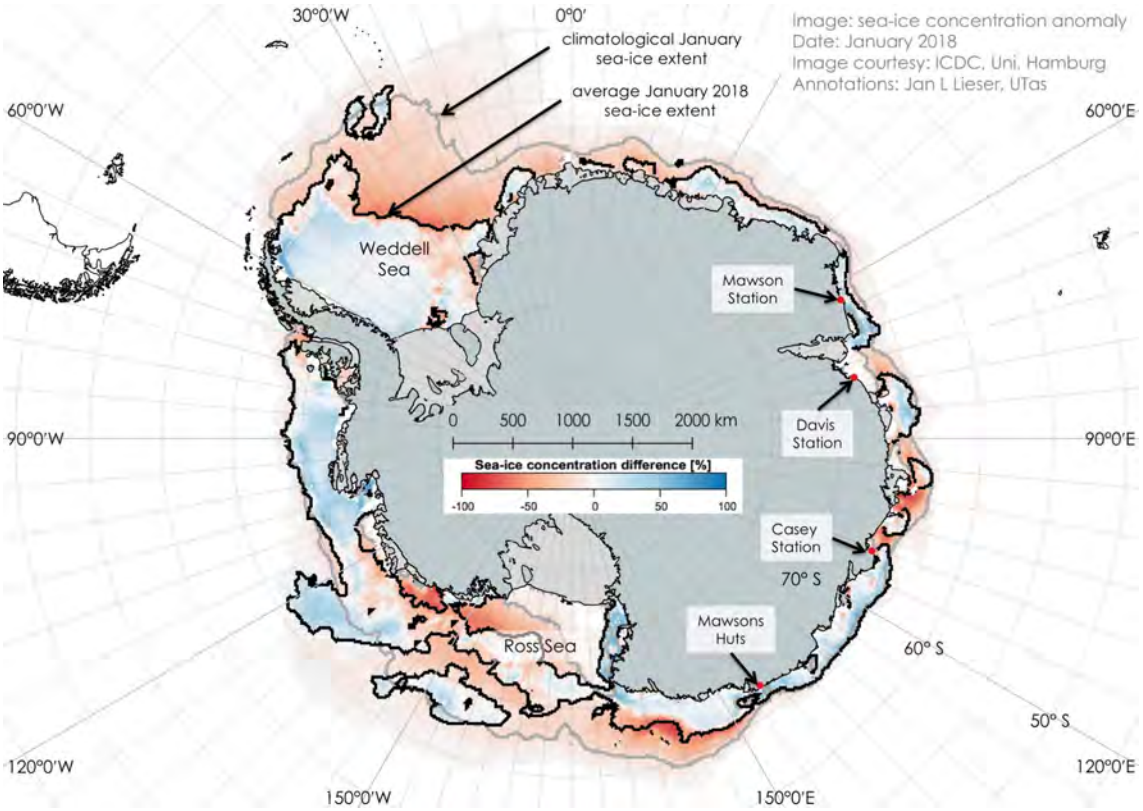

Figure 1: Sea-ice concentration anomaly for January 2018 provided by ICDC, Universität Hamburg.

In January 2018, very low sea-ice concentration and extent were still the most prominent feature of the Weddell Sea. In the Ross Sea and parts of East Antarctica, highly variable sea-ice concentration anomaly and extent manifested itself, while between 70° W and 110° W sea-ice extent was close to average with slightly above average sea-ice concentration within this extent.

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Casey Station

Figure 2 shows visible data of Law Dome and offshore.

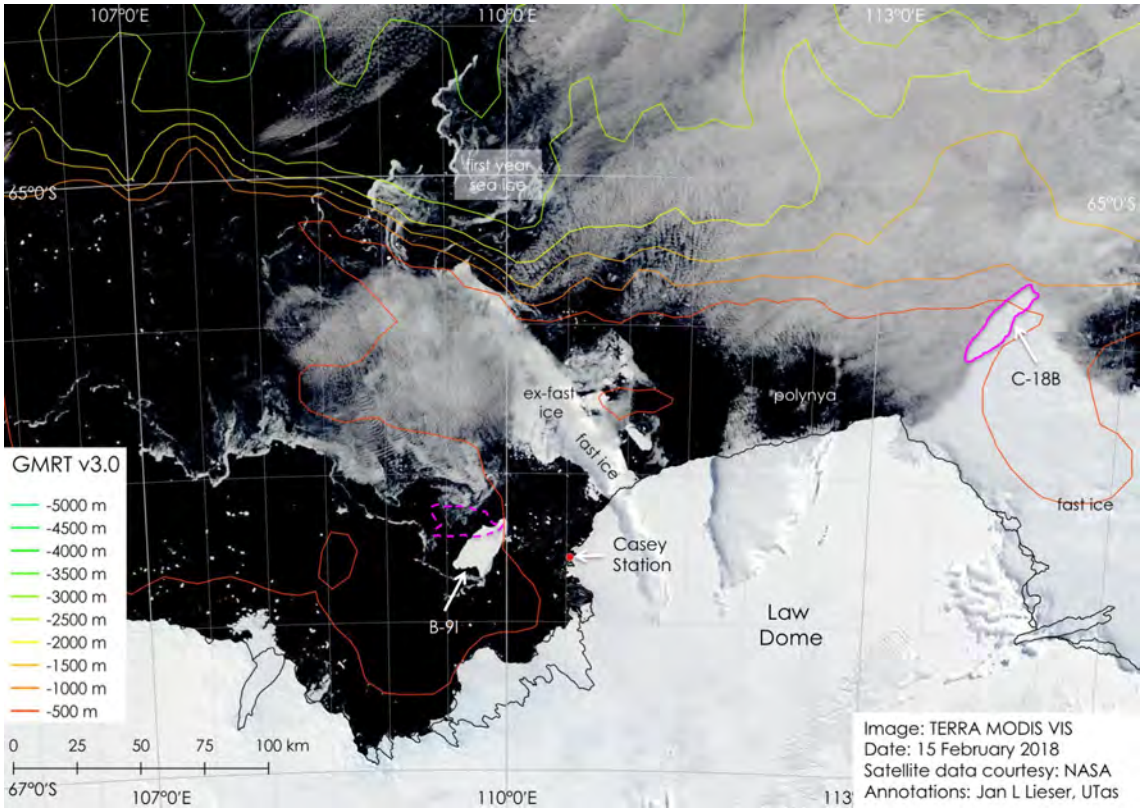

Figure 2: TERRA MODIS VIS scene acquired 15/02/2018 and provided by NASA.

Further to Sea Ice Report #07.3/2018, iceberg B-9I has rotated more than 50 degrees anti-clockwise during the roughly 24 hours between the two data acquisitions (position on 14/02/2018 indicated by the dashed, pink shape).

Sea Ice Report #07.5/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
16/02/2018

Ross Sea

Figure 1 shows a high-resolution SAR scene of Ross Sea. Yellow dots mark proposed stations of RV *Tangaroa* 2018 Voyage 02. An blue-white line marks the cruise track of the vessel up until 11/02/2018 03:00 UT.

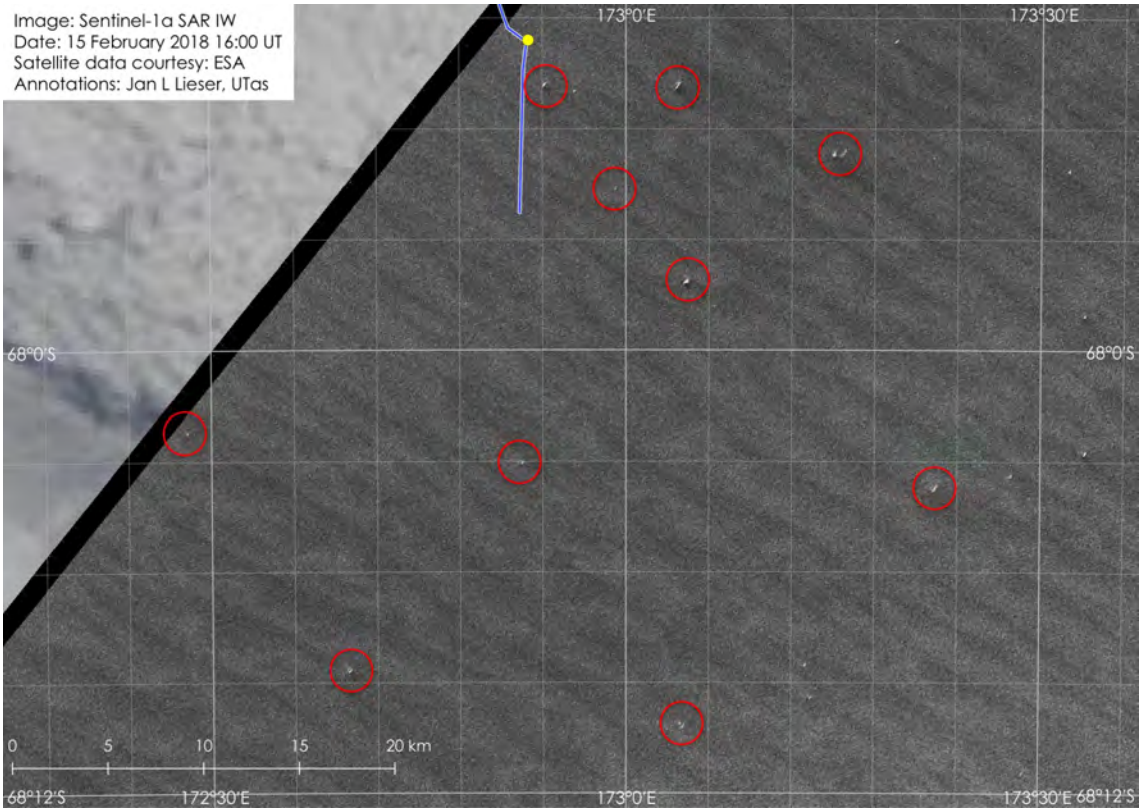

Figure 1: Sentinel-1b SAR EW acquired 15/02/2018 at 16:00 UT, and provided by PolarView; complemented by AQUA MODIS VIS data acquired 15/02/2018 and provided by NASA (see Figure 3).

The SAR scene shows the presence of isolated icebergs in the region, some of which are marked by red circles.

Figure 2 shows a southward continuation of the high-resolution SAR scene of Figure 1. Figure 3 shows the same frame as Figure 2, but visible data captured roughly 12 hours earlier.

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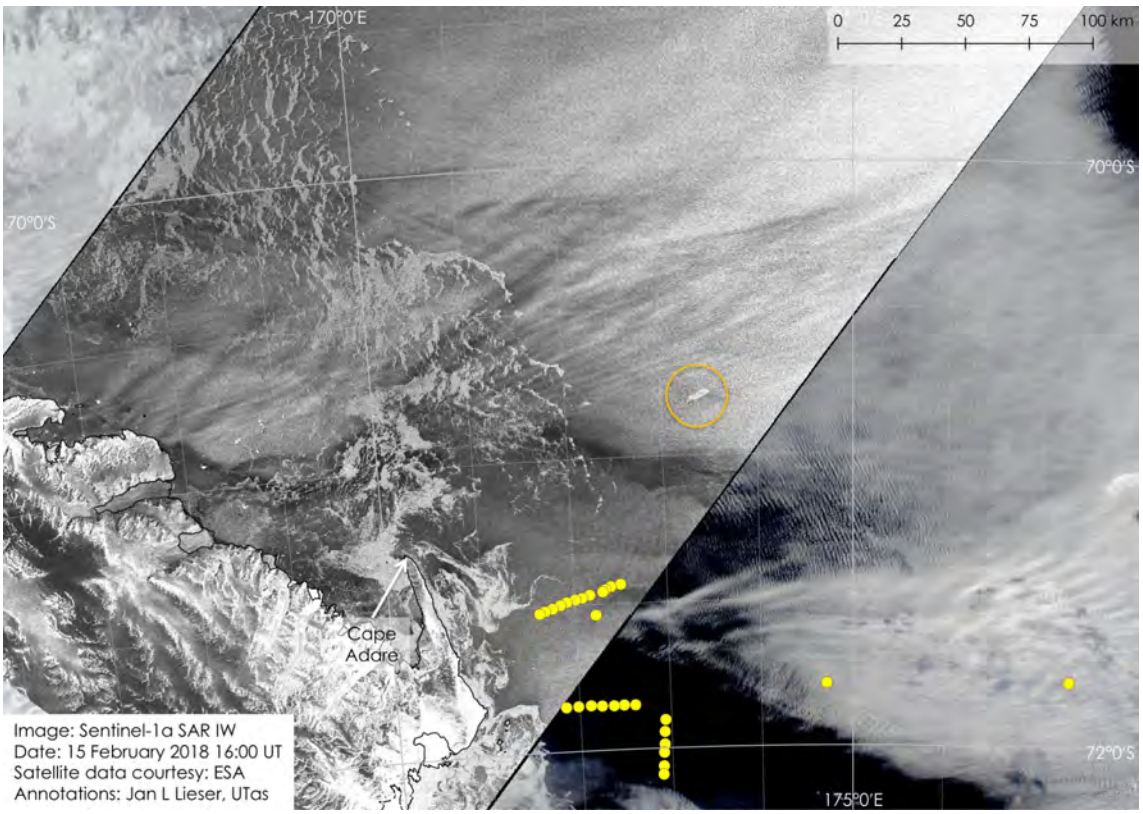

Figure 2: Sentinel-1a SAR IW data acquired 15/02/2018 at 16:00 UT and provided by PolarView; complemented by AQUA MODIS VIS data acquired 15/02/2018 and provided by NASA (see Figure 3).

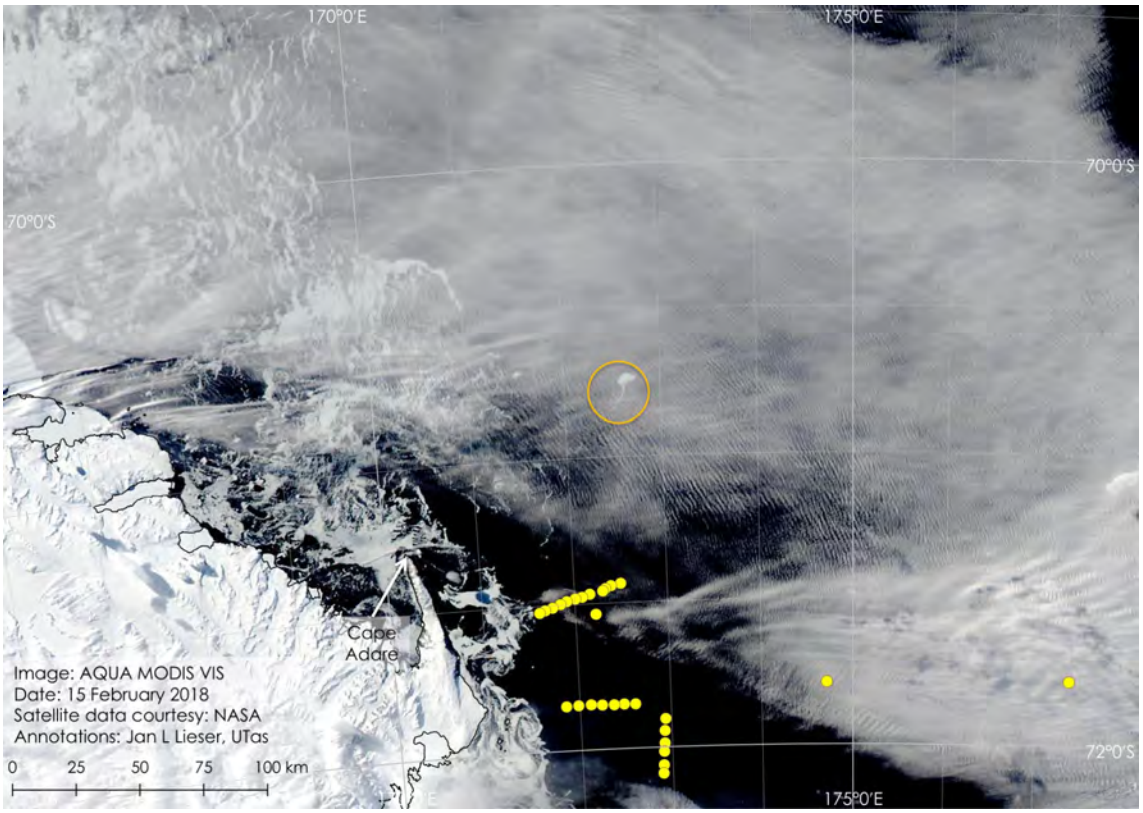

Figure 3: AQUA MODIS VIS data acquired 15/02/2018 and provided by NASA.

North of Cape Adare, strips and patches of loose sea ice are drifting eastward and therefore extending the sea-ice zone, which results in an eastward shift of the sea-ice edge. A patch of sea ice is marked by an orange circle in Figures 2 and 3, and has travelled roughly 16 nautical miles between acquisitions and changed shape to a more elongated patch. However, west of 171° E, the bulk of the patchy sea ice appears to travel a little slower than the furthest patch.

Sea Ice Report #07.6/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
16/02/2018

Casey Station

Figure 1 shows visible data off Law Dome and Vincennes Bay.

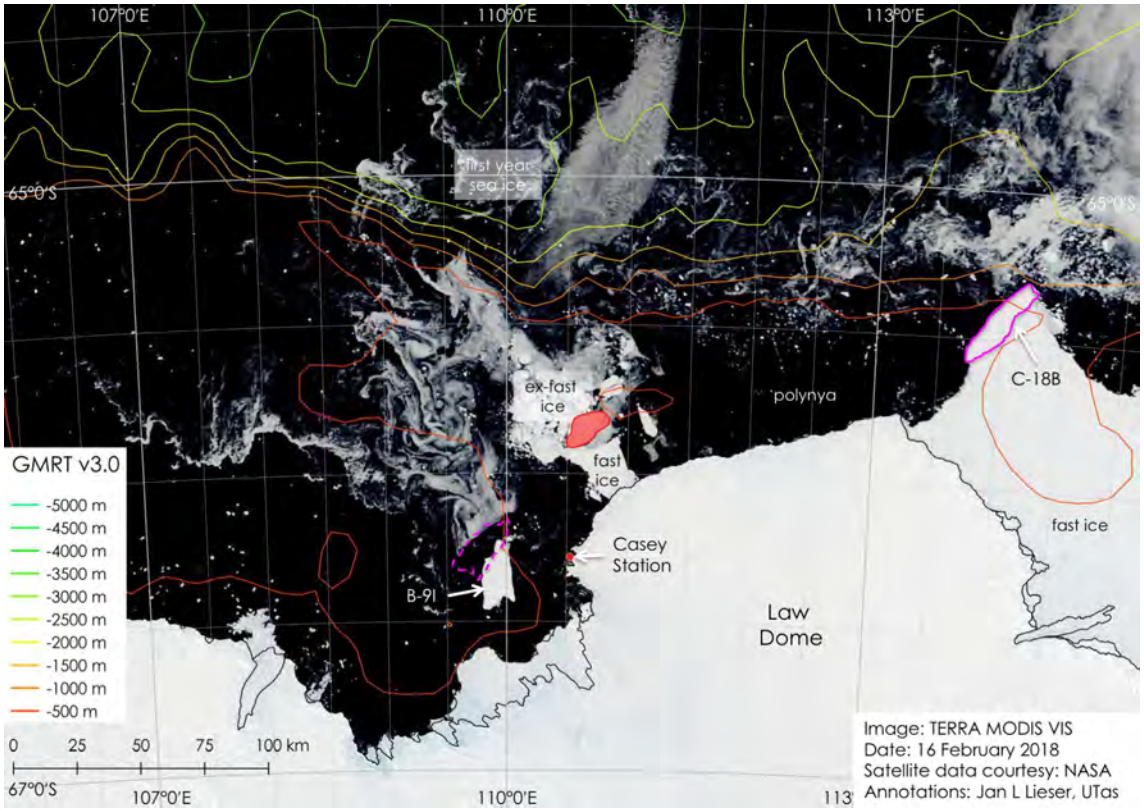

Figure 1: TERRA MODIS VIS scene acquired 16/02/2018 and provided by NASA.

Further to Sea Ice Report #07.4/2018, iceberg B-9I has rotated a further 30 degrees anti-clockwise during the roughly 24 hours between the two data acquisitions (position on 15/02/2018 indicated by the dashed, pink shape). The northern end of the berg has also moved roughly 5 nautical miles further south into Vincennes Bay.

North of Casey Station, fast ice continues to break up with at least one sheet of more than 130 km^2 (red shape) now drifting freely.

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Sea Ice Report #08.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
19/02/2018

Cooperation Sea

Figure 1 shows a SAR and visible data composite of Cooperation Sea. The orange line marks the cruise track of RSV *Aurora Australis* up until 19/02/2018 00:00 UT.

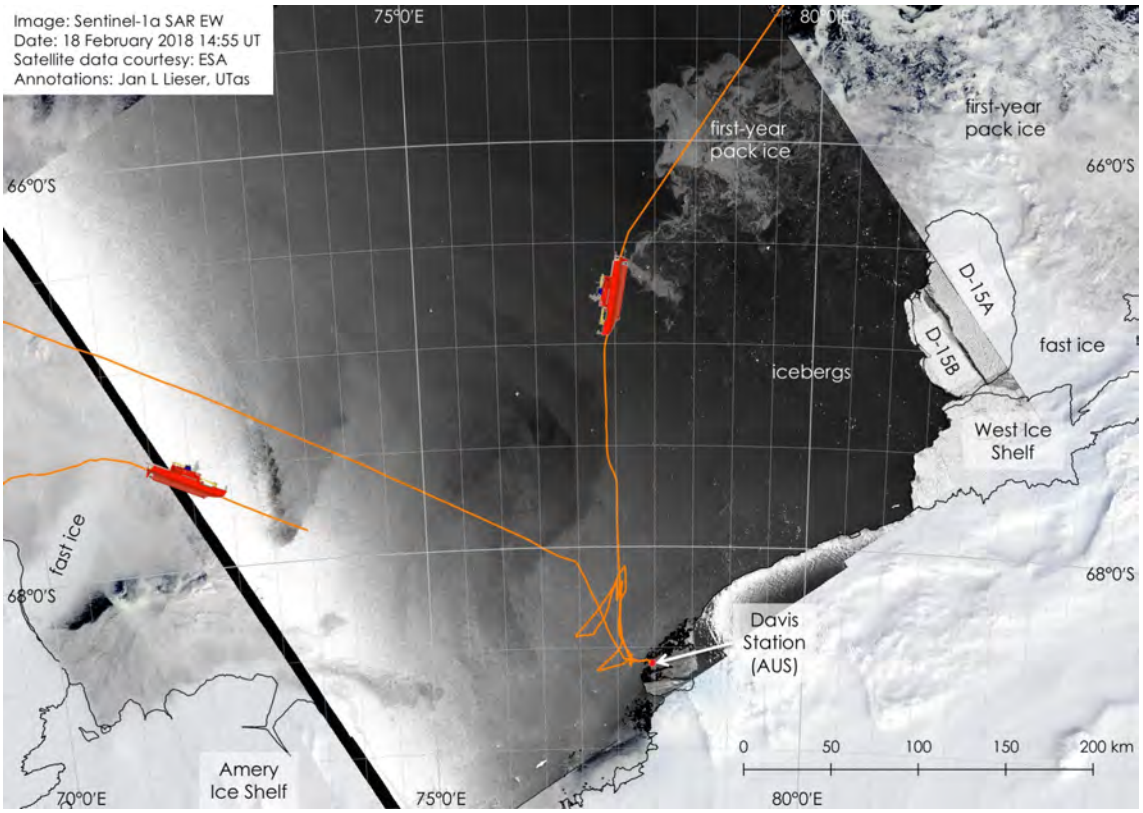

Figure 1: Sentinel-1a SAR EW scene acquired 18/02/2018 at 14:55 UT and provided by PolarView; complemented by AQUA MODIS VIS data acquired 18/02/2018 and provided by NASA.

A melange of first-year pack ice and ex-fast ice originating from the region north and east of the D-15 icebergs and the West ice Shelf is entering eastern Cooperation Sea. While it shows generally low to medium-high sea-ice concentration, there are still patches of very-high sea-ice concentration (for example at 78° 24' E and 66° 00' S).
Many isolated icebergs are west of the D-15 icebergs.

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Casey Station

Figure 2 shows SAR data off Law Dome and Vincennes Bay.

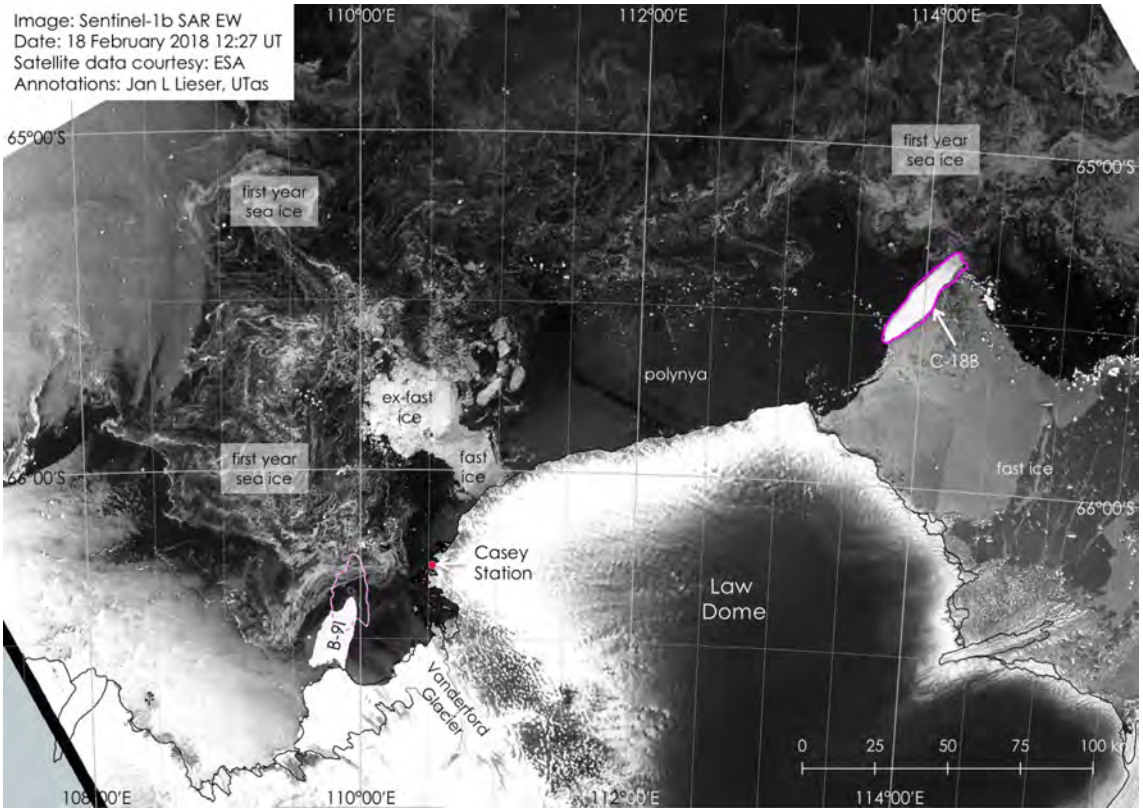

Figure 2: Sentinel-1b SAR EW scene acquired 18/02/2018 at 12:27 UT and provided by PolarView.

Further to Sea Ice Report #07.6/2018, iceberg B-9I continues its drift through Vincennes Bay (position on 16/02/2018 indicated by the dashed, pink/white shape). The berg has moved roughly 8 nautical miles further south and sits now off the shelf ice southwest of Vanderford Glacier.

Sea Ice Report #08.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
19/02/2018

Ross Sea

Figure 1 shows a sea-ice concentration chart of western Ross Sea. Yellow dots indicate proposed stations of RV *Tangaroa* 2018 Voyage 02. A white line marks the cruise track of the vessel up until 16/02/2018 17:00 UT.

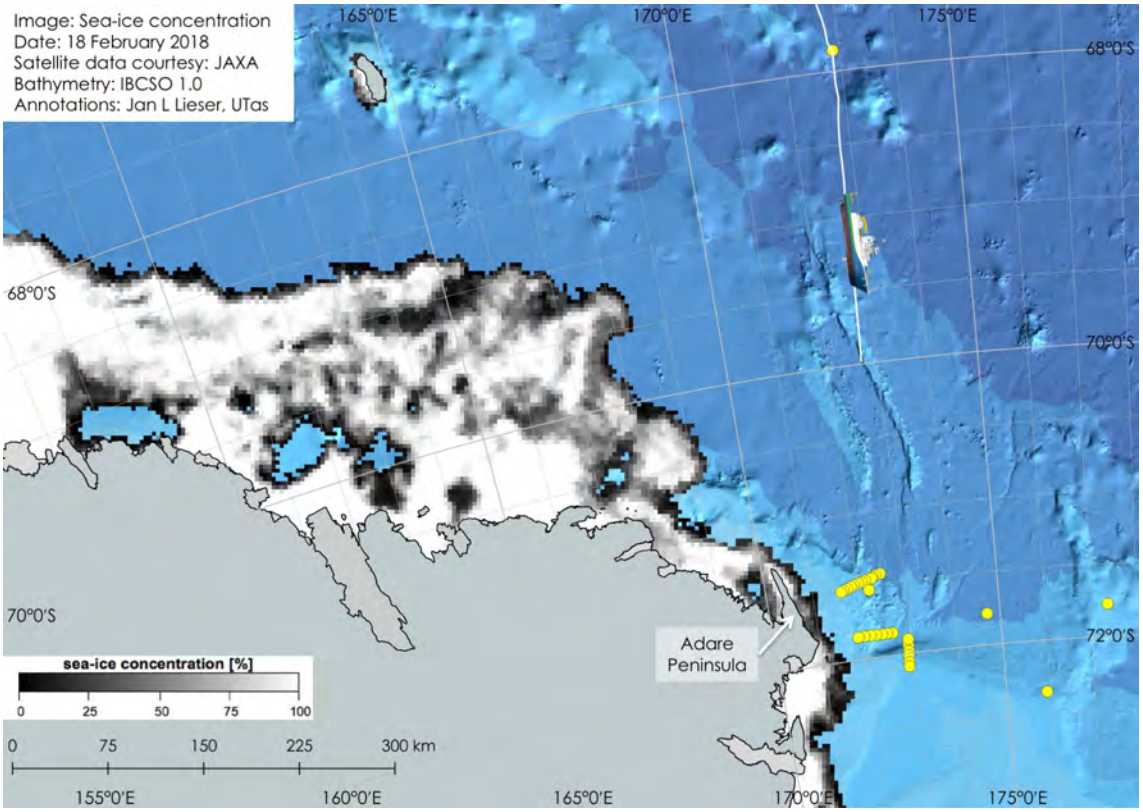

Figure 1: Sea-ice concentration data acquired 18/02/2018 and provided by Universität Hamburg.

Off Adare Peninsula, sea ice continues to melt in the region of proposed stations, however some isolated patches of sea ice may be found off the sea-ice edge (as indicated by the edge of sea-ice concentration data). Those patches may be below the detection limit of the AMSR-2 data processing routine.

In the entire area of the map (Figure 1), icebergs or fragments of icebergs can be present.

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Sea Ice Report #08.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
20/02/2018

Cooperation Sea

Figure 1 shows a SAR and visible data composite of Cooperation Sea. The orange line marks the cruise track of RSV *Aurora Australis* up until 20/02/2018 00:00 UT.

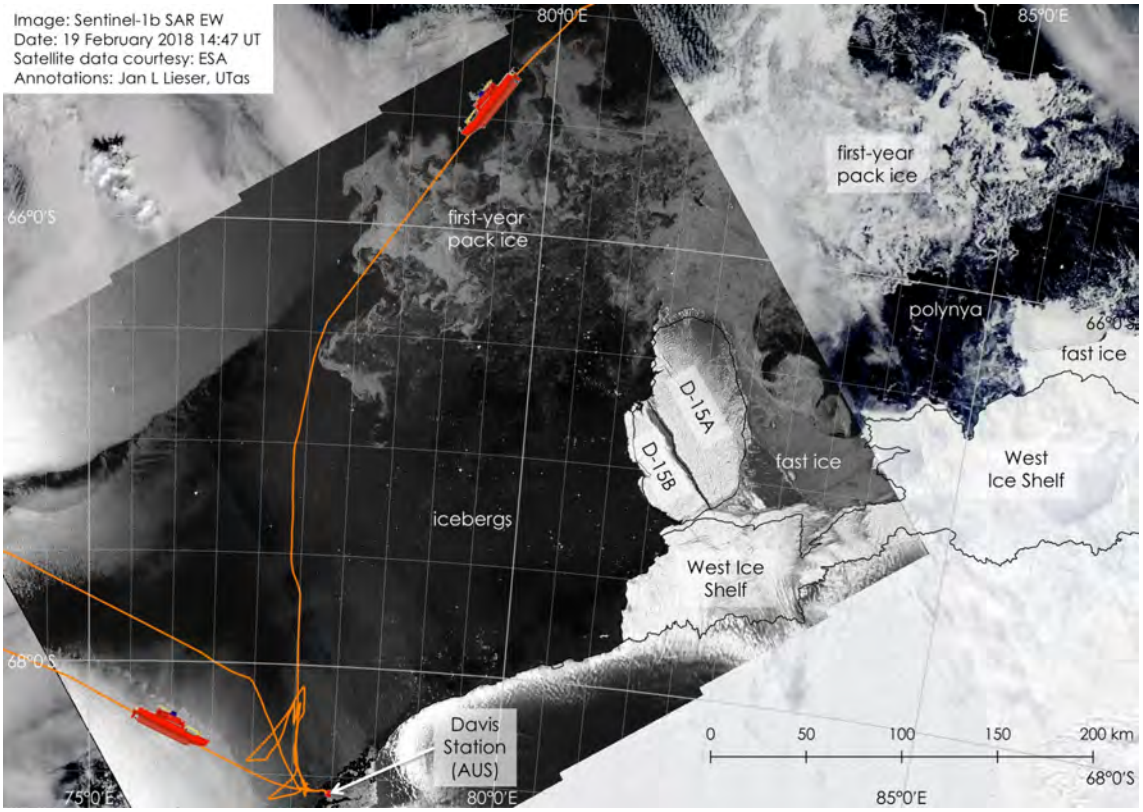

Figure 1: Sentinel-1a SAR EW scene acquired 19/02/2018 at 14:47 UT and provided by PolarView; complemented by AQUA MODIS VIS data acquired 19/02/2018 and provided by NASA.

North of the West Ice Shelf and the D-15 icebergs, a melange of first-year pack ice and ex-fast ice is drifting generally westwards and continues to melt. Between Davis Station and this mixture of sea-ice types, a large number of icebergs is present, most of which are drifting freely, but some are grounded.

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Figure 2 shows a sea-ice concentration chart off East Antarctica. The position of the SAR scene of Figure 1 is marked by the black/yellow frame.

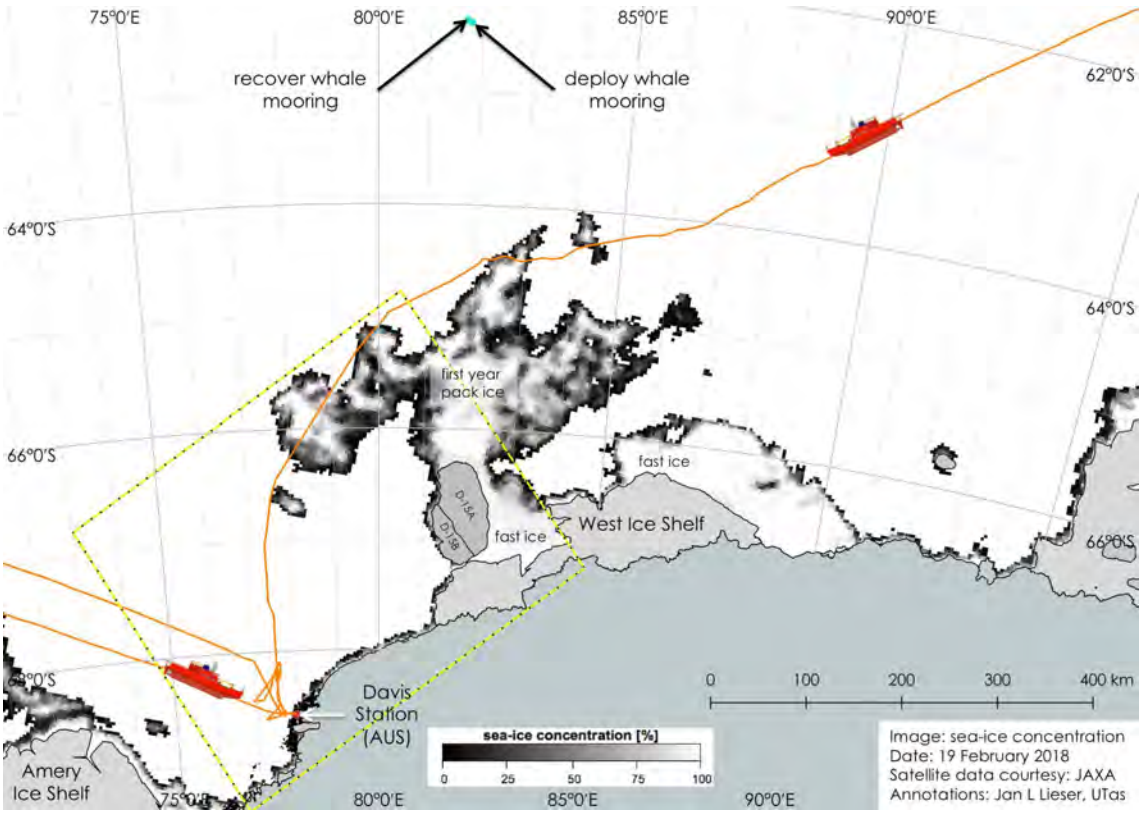

Figure 2: Sea-ice concentration data acquired 19/02/2018 and provided by Universität Hamburg.

The locations of a proposed whale-mooring changeover are roughly 150 nautical miles north of the sea-ice edge, but previous high-resolution SAR scenes reveal a number of icebergs in the area.

Sea Ice Report #08.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
21/02/2018

Cooperation Sea

Figure 1 shows a SAR scene of eastern Cooperation Sea.

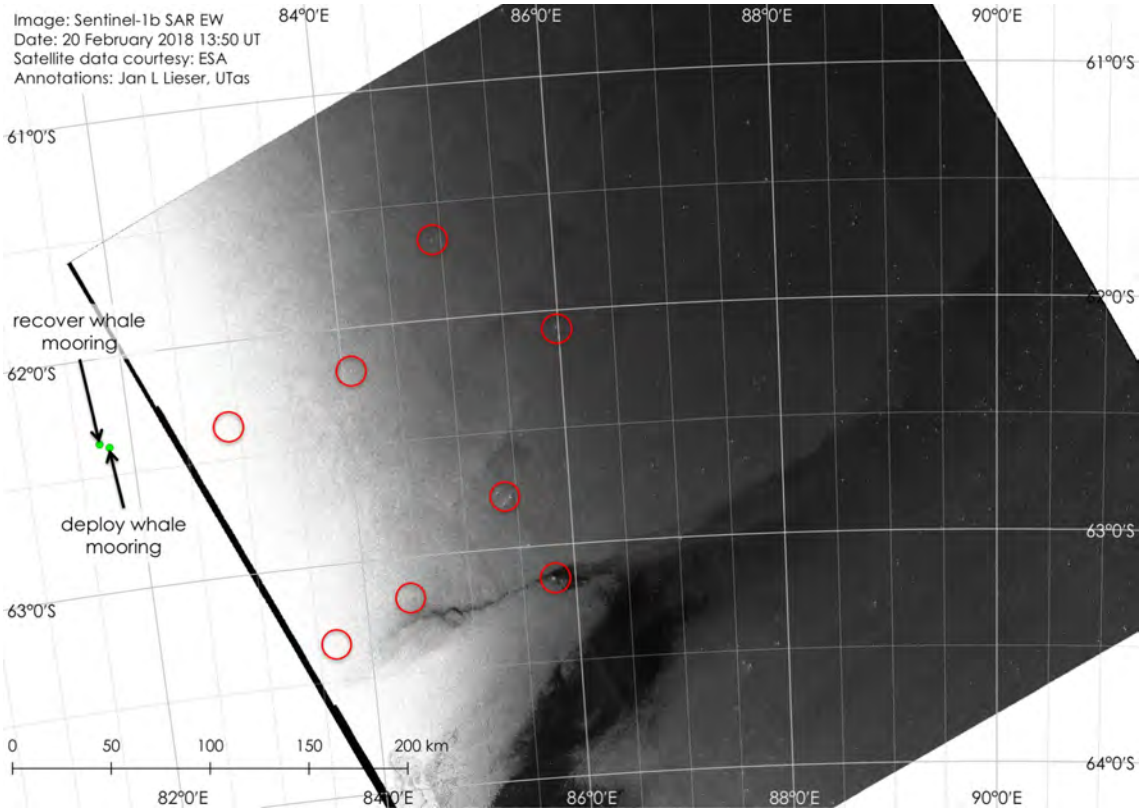

Figure 1: Sentinel-1b SAR EW scene acquired 20/02/2018 at 13:50 UT and provided by PolarView.

Further to Sea Ice Report #08.3/2018, new SAR imagery confirms the presence of many icebergs as far north as 61° S in the region. West of 86° E, some icebergs are marked by red circles in the figure, but many more can be seen in the high-resolution SAR east of 86° E as bright, white spots.

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Sea Ice Report #08.5/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
22/02/2018

Ross Sea

Figure 1 shows a SAR scene of the Ross Sea (a white, dashed line oriented southwest-northeast is an image artefact where two scenes are stitched together). Light-blue dots indicate proposed stations of RV *Tangaroa* 2018 Voyage 02.

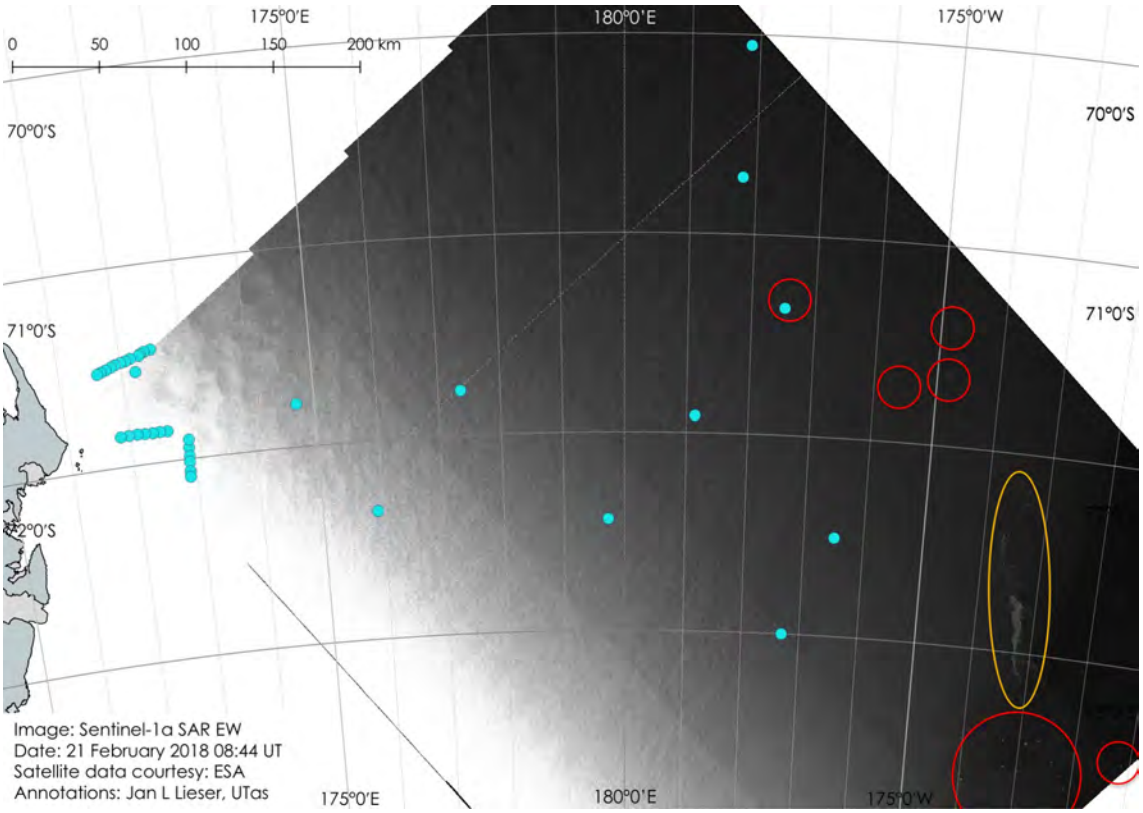

Figure 1: Sentinel-1a SAR EW data acquired 21/02/2018 at 08:44 UT and provided by PolarView.

The region covered by the SAR scene is largely free of sea ice, except for a small strip and patch of sea ice, as marked by an orange ellipse. Red circles point to positions of icebergs large enough to show as white dots in the SAR.

In the entire area of the map (Figure 1), icebergs or fragments of icebergs can be present.

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Sea Ice Report #08.6/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
22/02/2018

Cooperation Sea

Figure 1 shows two SAR scenes of eastern Cooperation Sea. The orange line marks the cruise track of RSV *Aurora Australis* up until 22/02/2018 00:50 UT.

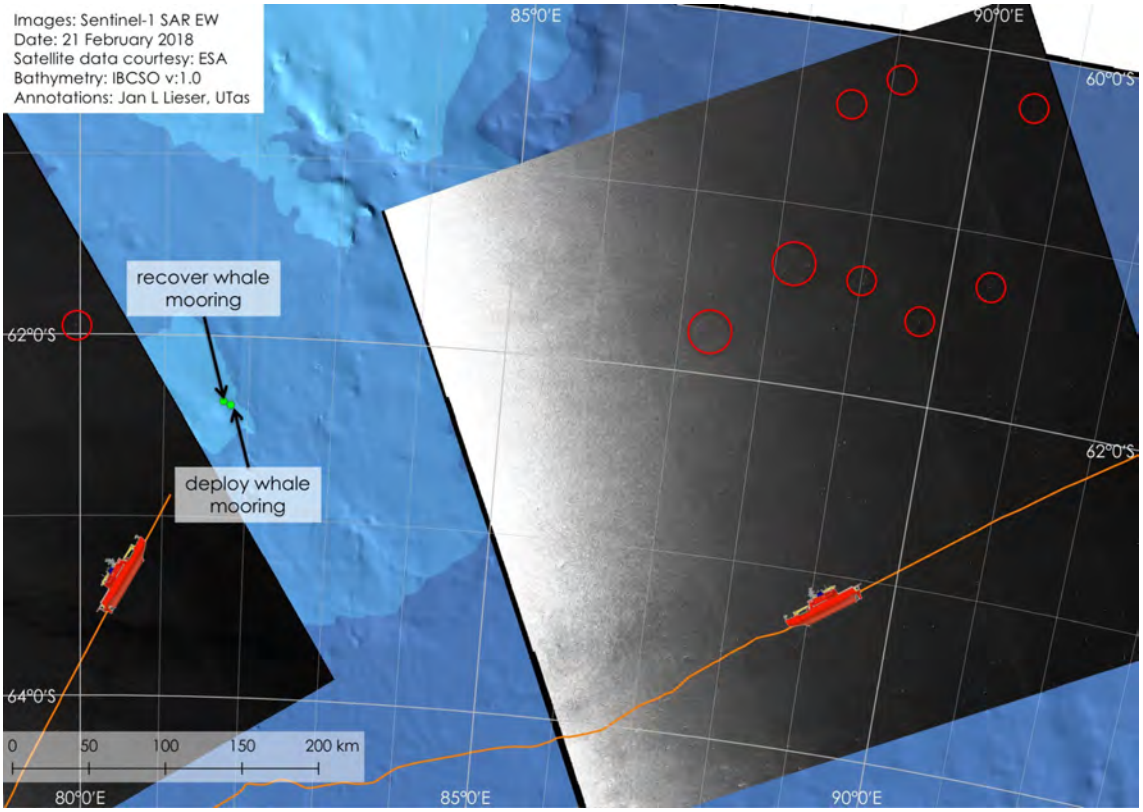

Figure 1: Western scene: Sentinel-1b SAR EW scene acquired 21/02/2018 at 14:31 UT; eastern scene: Sentinel-1a SAR EW scene acquired 21/02/2018 at 13:41 UT, both scenes provided by PolarView.

The eastern SAR scene shows the presence of many icebergs as far north as 60° S, some of which are marked by red circles in the figure.

Apart from ice of land origin, there is no other ice detectable in the region of Figure 1.

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Sea Ice Report #08.7/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
23/02/2018

Cooperation Sea

Figure 1 shows a SAR scene of eastern Cooperation Sea. The orange line marks the cruise track of RSV *Aurora Australis* up until 22/02/2018 22:00 UT.

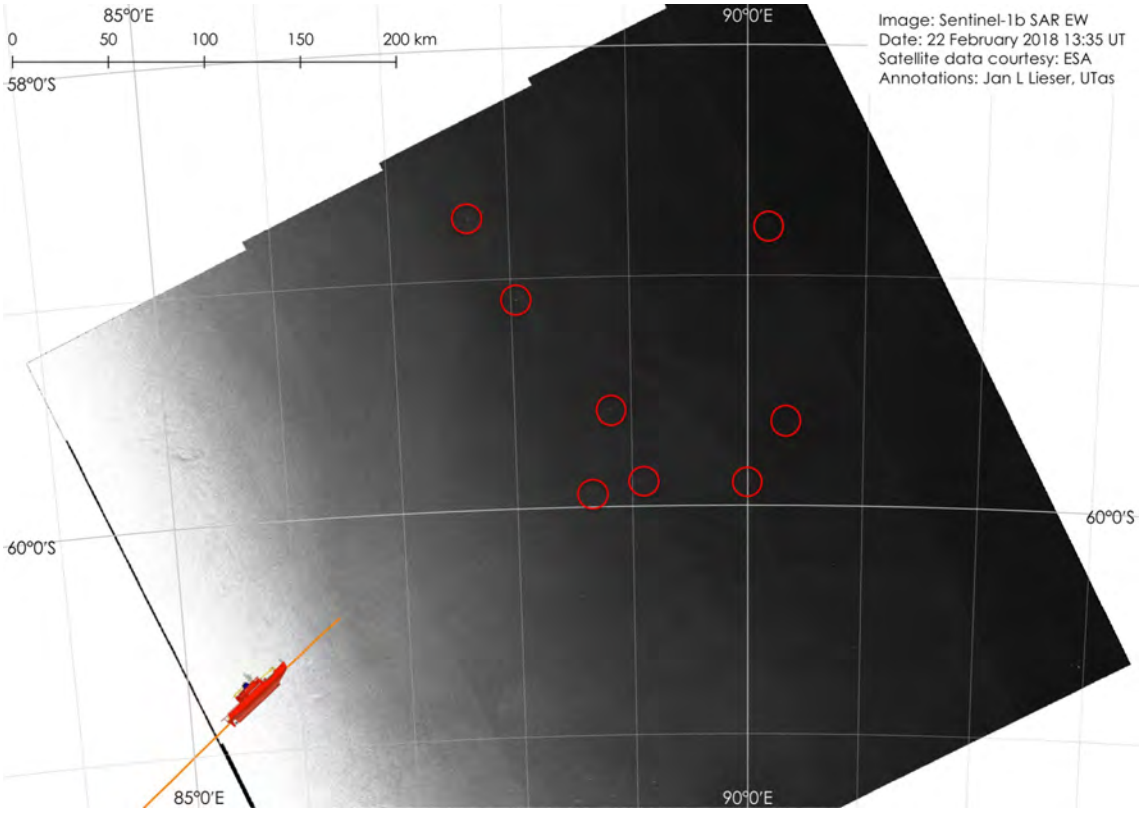

Figure 1: Sentinel-1b SAR EW scene acquired 22/02/2018 at 13:35 UT and provided by PolarView.

The SAR scene reveals the presence of many icebergs north of 60° S, some of which are marked by red circles in the figure.

Apart from ice of land origin, there is no other ice detectable in the region of Figure 1.

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D'Urville Sea

Figure 2 shows a visible scene of D'Urville Sea. Pink shapes mark large icebergs (dashed shapes show positions on 13/02/2018).

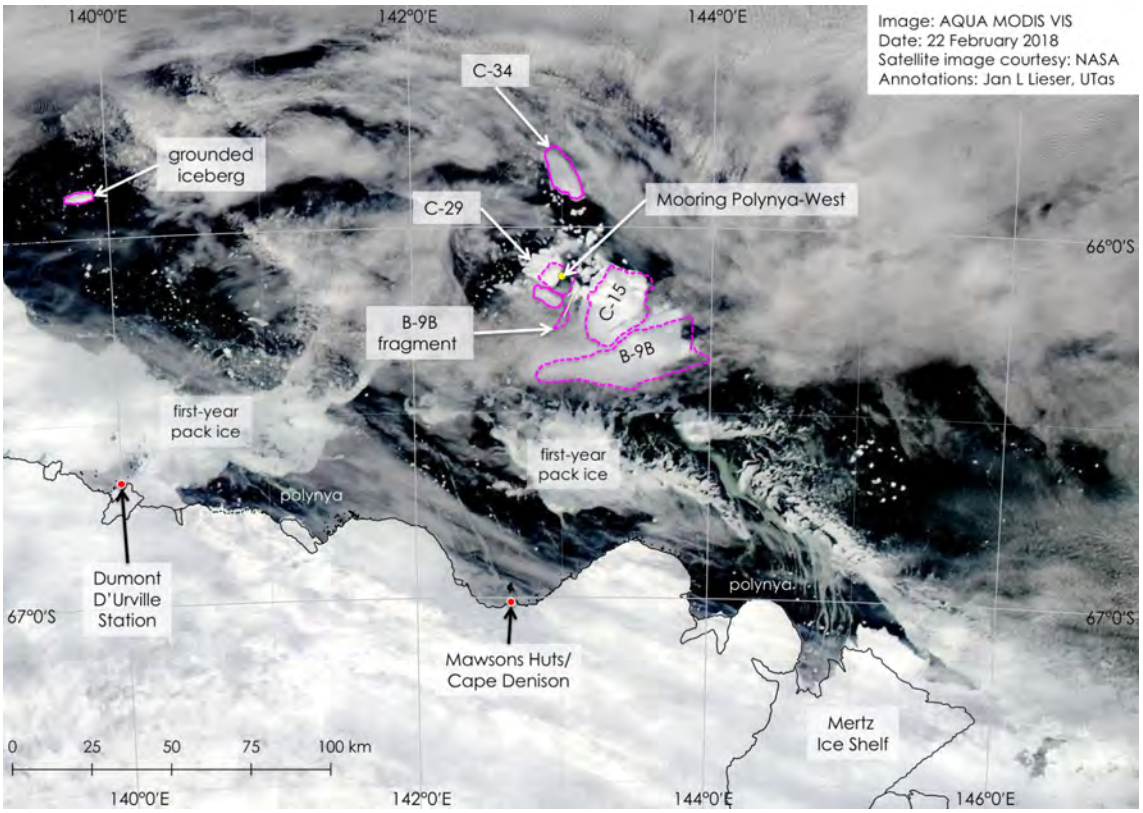

Figure 2: AQUA MODIS VIS data acquired 22/02/2018 and provided by NASA.

Icebergs B-9B, C-15 and C-29 appear still restless, but remain surrounded by many smaller icebergs, which are grounded. The general drift of the three large bergs is northwestward with different overall movement, but a fragment of B-9B has travelled northeastward and sits now just west of iceberg C-15 (thin white arrow).

The location of an oceanographic mooring (yellow dot) is currently free of ice.

Sea Ice Report #09.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
26/02/2018

Ross Sea

Figure 1 shows a SAR scene of the Ross Sea (punch holes along 180° E in the SAR data are processing artefacts). Yellow dots indicate proposed stations of RV *Tangaroa* 2018 Voyage 02.

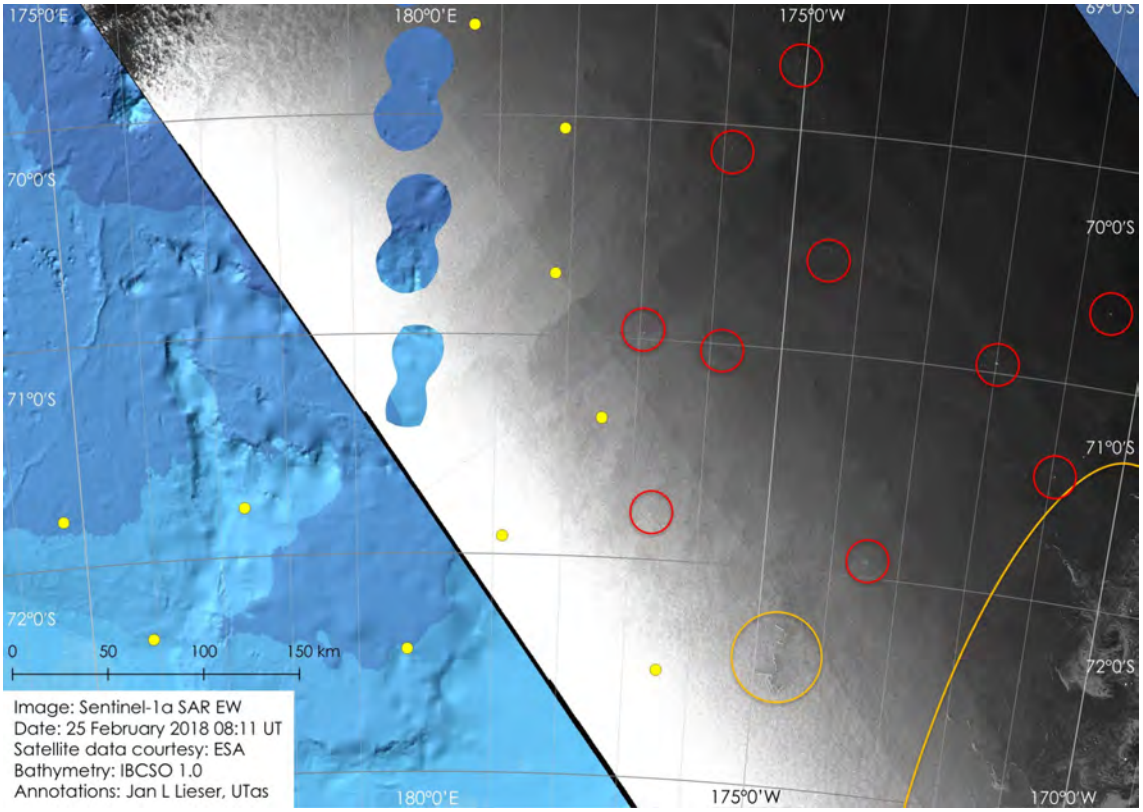

Figure 1: Sentinel-1a SAR EW data acquired 25/02/2018 at 08:11 UT and provided by PolarView.

The region covered by the SAR scene is largely free of sea ice, except for areas of strips and patches of sea ice, as marked by orange circles. Some icebergs are large enough to show as white dots in the SAR, some of those icebergs have been marked by red circles in the figure.

In the entire area of the map (Figure 1), icebergs or fragments of icebergs can be present.

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Sea Ice Report #09.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
01/03/2018

Ross Sea

Figure 1 shows a sea-ice concentration chart of the Ross Sea. Yellow dots indicate proposed stations of RV *Tangaroa* 2018 Voyage 02.

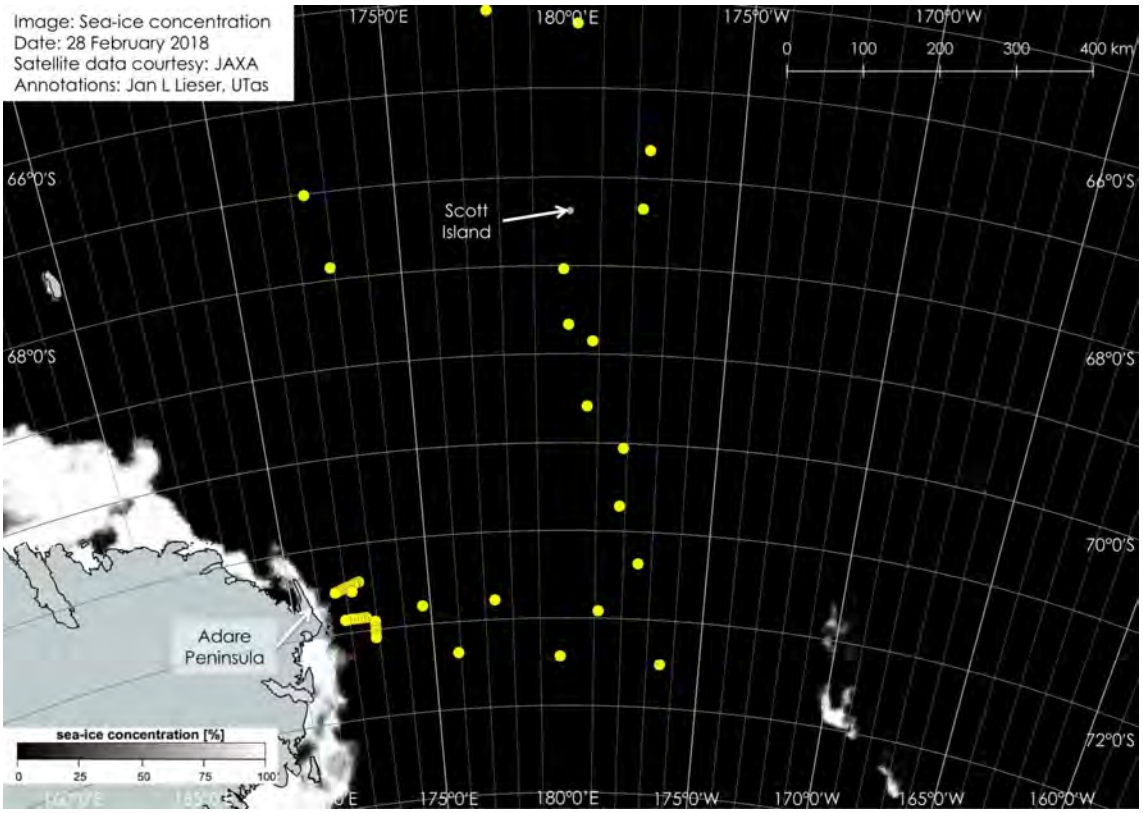

Figure 1: Sea-ice concentration data acquired 28/02/2018 and provided by Universität Hamburg.

The northern part of the Ross Sea remains largely free of sea ice. Some sea ice is found nearshore, around Adare Peninsula, and isolated patches of sea ice show in the AMSR-2 data south of 71° S, and along and east of 170° W.

In the entire area of the map (Figure 1), icebergs or fragments of icebergs can be present.

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Sea Ice Report #09.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
02/03/2018

Mawson Coast

Figure 1 shows a visible scene of eastern Mawson Coast.

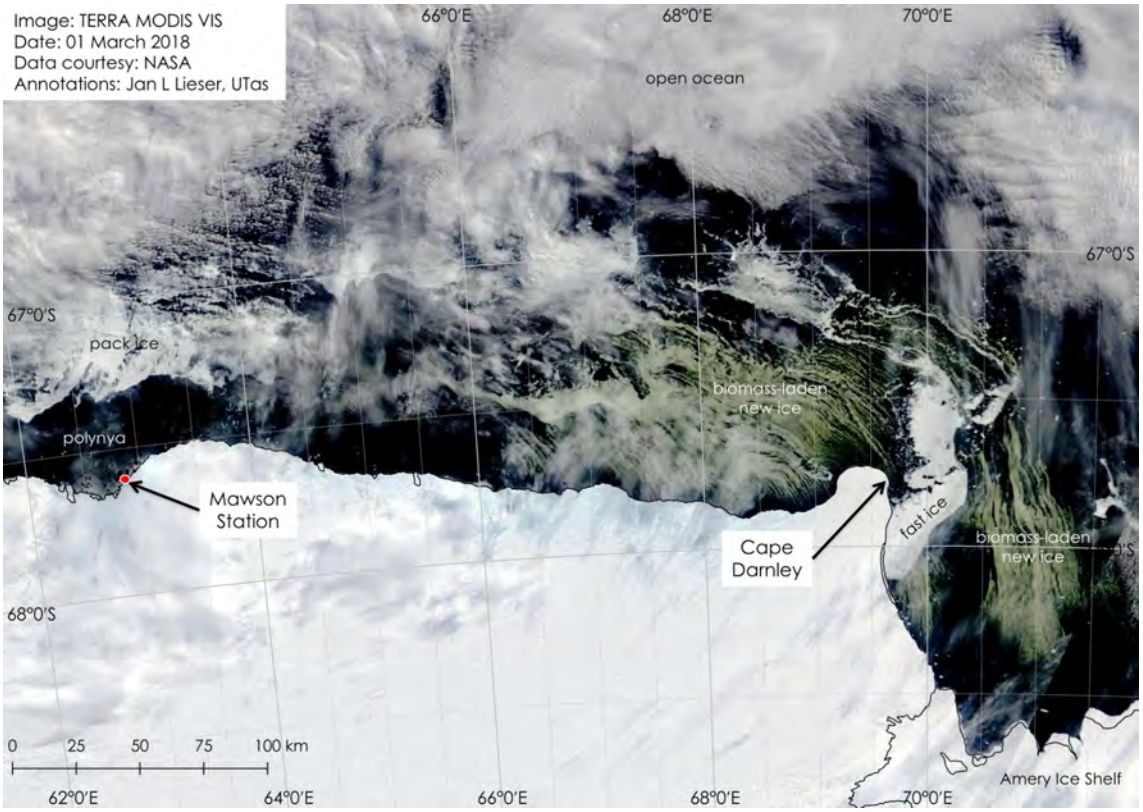

Figure 1: TERRA MODIS VIS data acquired 01/03/2018 and provided by NASA.

Between Mawson Station and Cape Darnley, eastern Mawson Coast is now free of fast ice. The last remaining fast ice east of the cape is also showing strong signs of breaking up.

New sea-ice formation has now started as can be seen the visible image. A green sea-ice discolouration can clearly be seen northwest of Cape Darnley and north of the Amery Ice Shelf. This tint is caused by biological activity associated with the new sea ice.

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Casey Station

Figure 2 shows a visible scene of Vincennes Bay southwest of Casey Station.

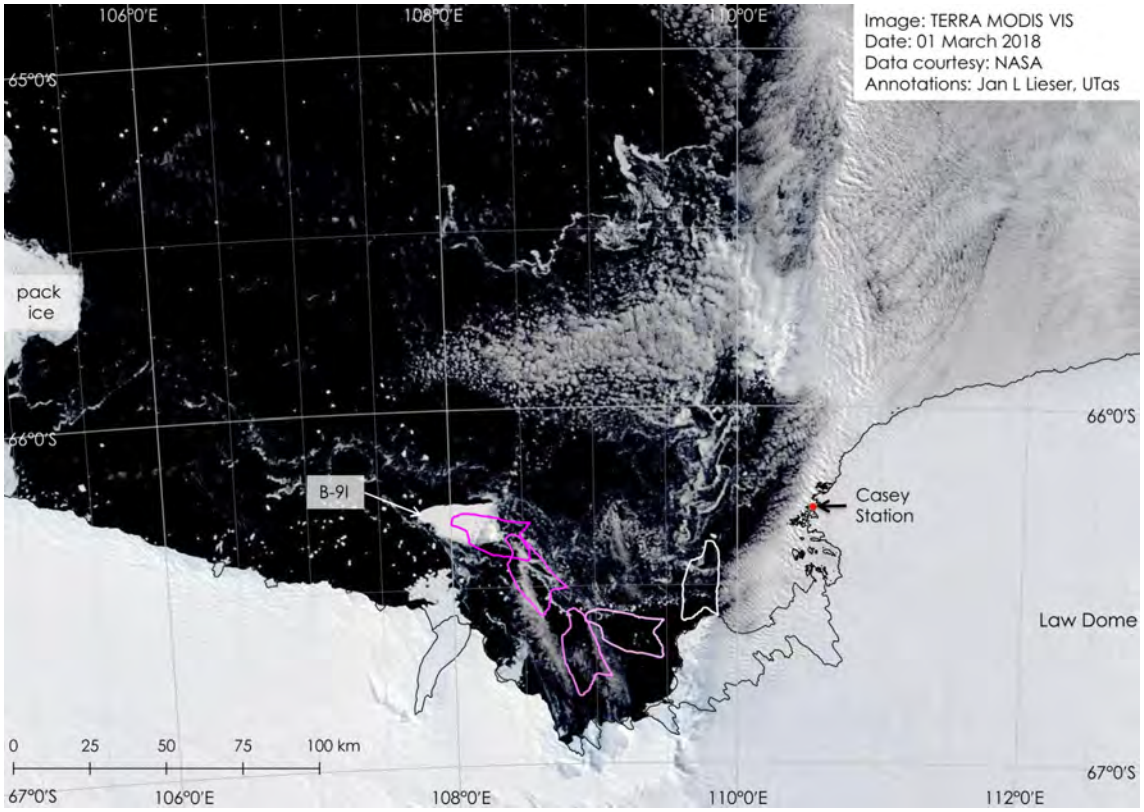

Figure 2: TERRA MODIS VIS data acquired 01/03/2018 and provided by NASA.

North of Casey Station, fast ice continues to break up (slightly obscured by clouds in Figure 2). Strips and patches of old sea ice are floating freely northward and westward.

Of curious note is the drift of iceberg B-9I through Vincennes Bay. Coloured shapes indicate its positions since 19/02/2018 (from white to dark pink: 19/02/2018, 21/02/2018, 23/02/2018, 27/02/2018, 28/02/2018; 01/03/2018 without shape).

D'Urville Sea

Figure 3 shows a visible scene of D'Urville Sea. Pink shapes mark large icebergs (dashed shapes show positions on 22/02/2018).

The location of an oceanographic mooring (yellow dot) is currently re-occupied by iceberg C-29.

New sea-ice formation is seen in the imagery. Offshore winds maintain a polynya close to shore and facilitate sea-ice production.

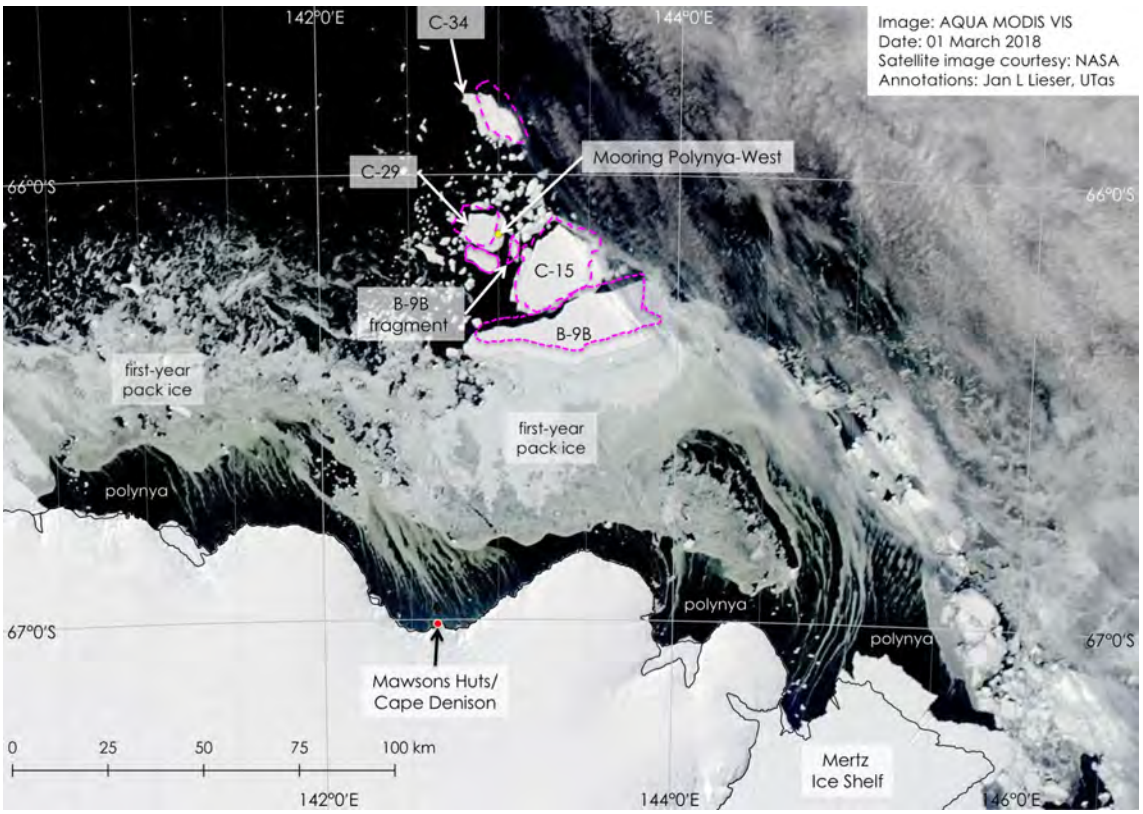

Figure 3: AQUA MODIS VIS data acquired 01/03/2018 and provided by NASA.

All four large icebergs appear restless but remain surrounded by many smaller icebergs, which are grounded. The annotated B-9B fragment has managed a 180 degree turn in the middle of all these bergs during the past week.

Sea Ice Report #10.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
05/03/2018

West Ice Shelf

Figure 1 shows a visible scene of the western West Ice Shelf and the D-15 icebergs.

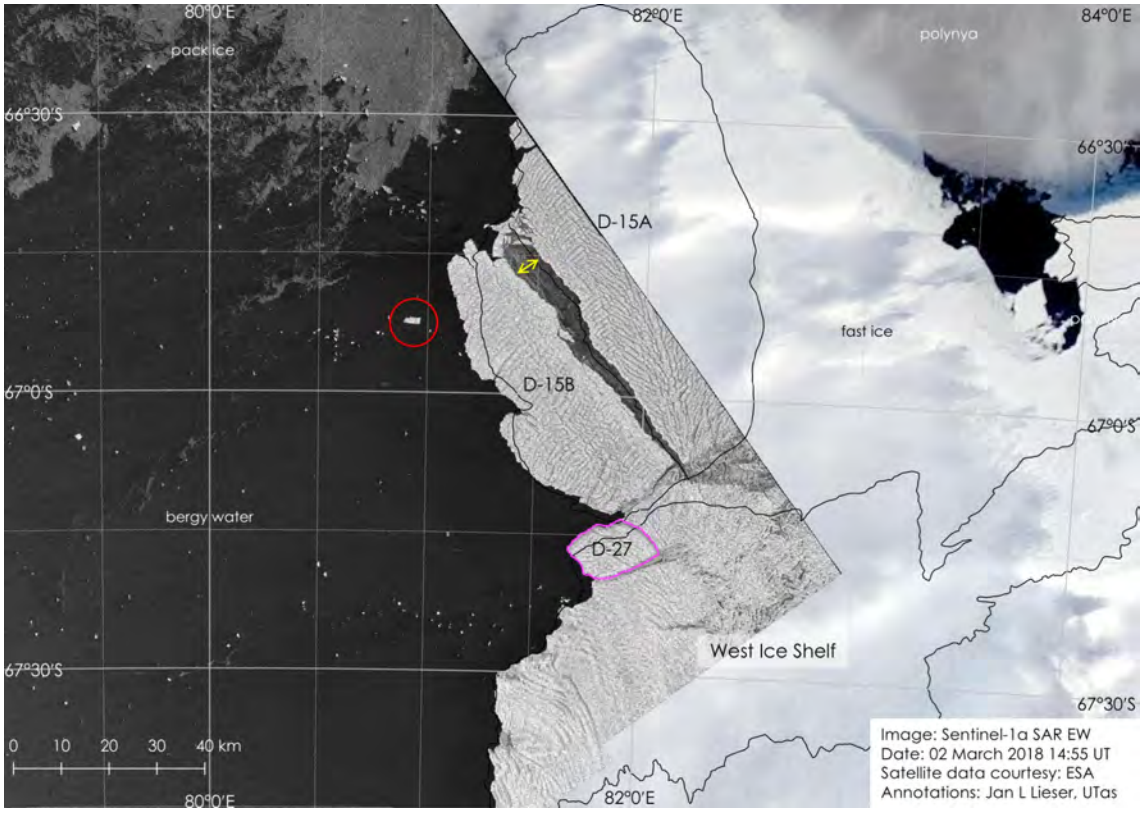

Figure 1: Sentinel-1a SAR EW scene acquired 02/03/2018 at 14:55 UT and provided by PolarView; complemented by AQUA MODIS VIS data acquired 02/03/2018 and provided by NASA.

Further to Sea Ice Report #06.1/2018, an iceberg that spawned from the northern edge of iceberg D-15B is now drifting freely southward (red circle) and the rift between the D-15 icebergs is now 6 km across at its northern end (yellow arrow), and widening.

Also, a fragment of the West Ice Shelf has now been recognised as new iceberg D-27, but is still considered to be grounded.

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Casey Station

Figure 2 shows a visible scene of Vincennes Bay southwest of Casey Station.

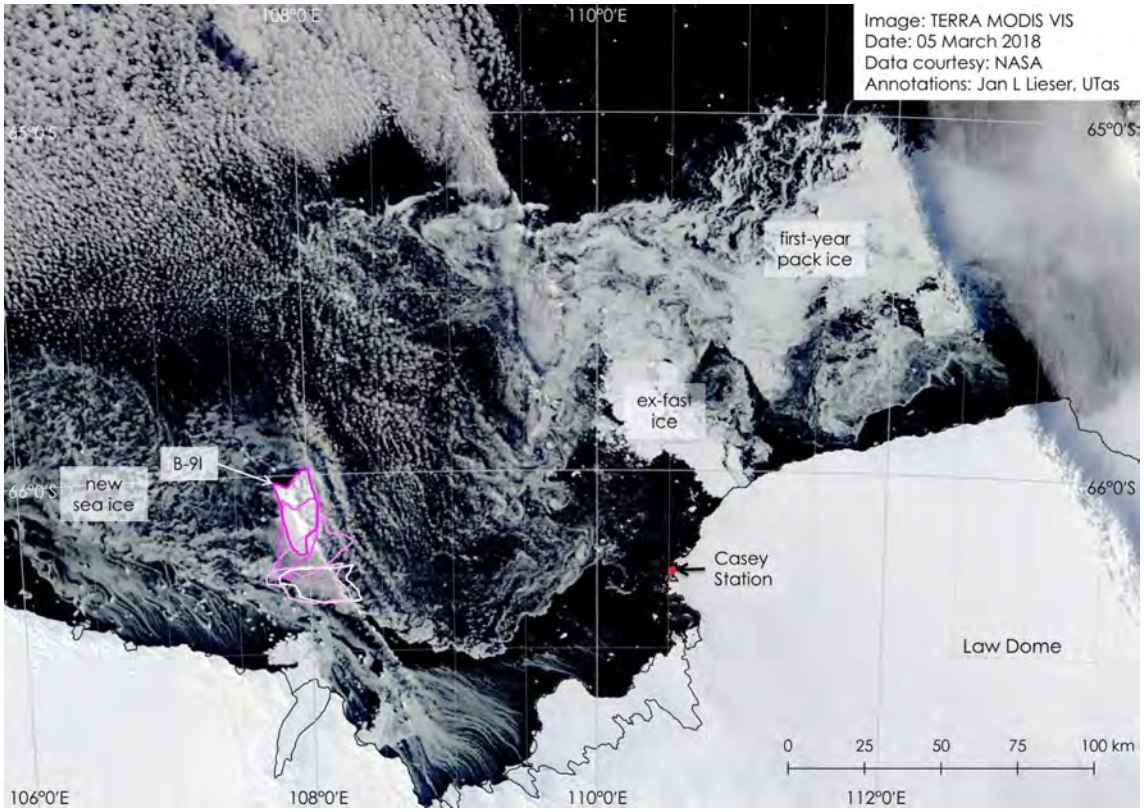

Figure 2: TERRA MODIS VIS data acquired 05/03/2018 and provided by NASA.

North of Casey Station, fast ice continues to break up. Formation of new sea-ice has started in Vincennes Bay and elsewhere. Offshore winds push the new ice northwestward and enhance new ice formation near the coast.

Further to Sea Ice Report #09.3/2018, we note the drift of iceberg B-9I now leaving Vincennes Bay. Coloured shapes indicate its positions since 01/03/2018 (from white to dark pink: 01/03/2018, 02/03/2018, 03/03/2018, 04/03/2018, 05/03/2018).

Sea Ice Report #10.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
06/03/2018

Ross Sea

Figure 1 shows a visible and SAR data composite of northern Ross Sea. Along 180° E, punch holes in the SAR data are a data-processing artefact. Yellow dots indicate proposed stations of RV *Tangaroa* 2018 Voyage 02.

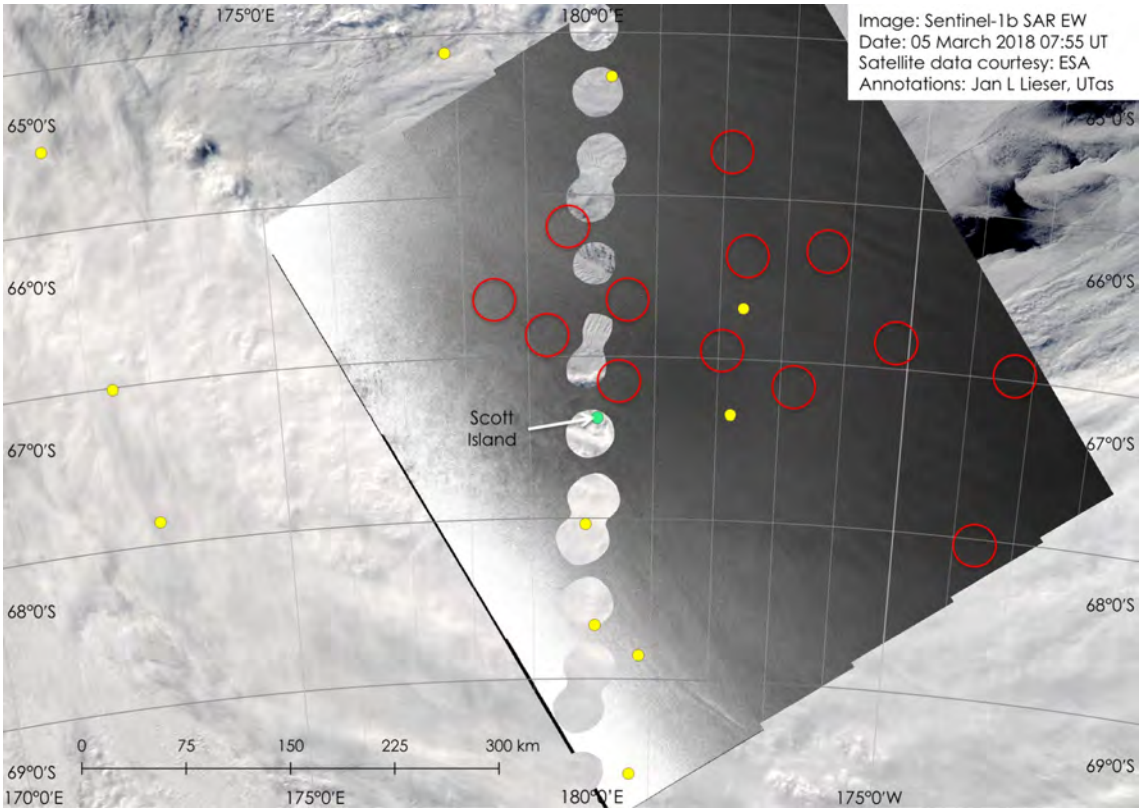

Figure 1: Sentinel-1b SAR EW data acquired 05/03/2018 and provided by PolarView; background: TERRA MODIS VIS data acquired 05/03/2018 and provided by NASA.

Visible data shows the cloud cover of a large low pressure system, which was centred roughly at 65° 30' S and 180° E at the time of acquisition.

The area illuminated by the SAR shows hardly any sea ice. However, in the entire area of the map (Figure 1), icebergs or fragments of icebergs are present, some of which are marked by red circles.

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Sea Ice Report #10.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
08/03/2018

Ross Sea

Figure 1 shows a SAR data composite of northern Ross Sea. Yellow dots indicate proposed stations of RV *Tangaroa* 2018 Voyage 02.

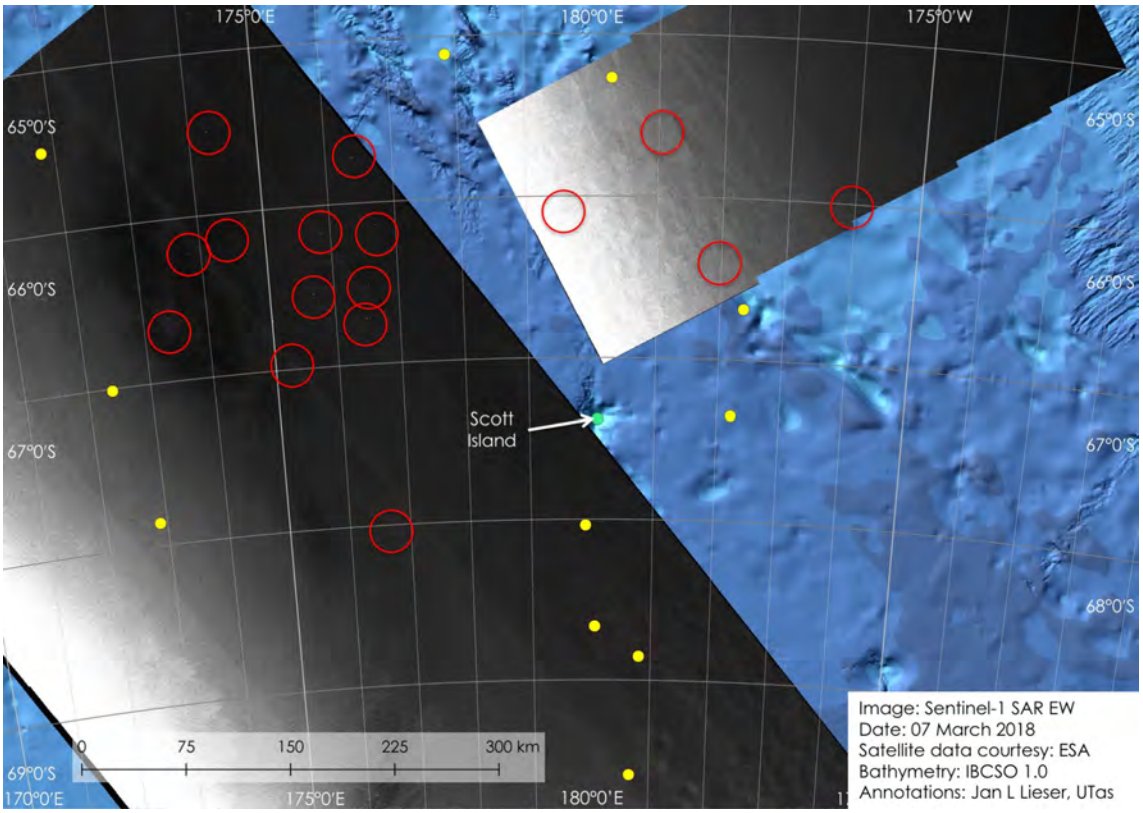

Figure 1: Northeastern scene: Sentinel-1b SAR EW data acquired 07/03/2018 at 07:39 UT; southwestern scene: Sentinel-1a SAR EW data acquired 07/03/2018 at 08:29 UT; all scenes provided by PolarView.

The area illuminated by the SAR shows no signs of sea ice. However, in the entire region of the map (Figure 1), icebergs or fragments of icebergs are present, some of which are marked by red circles.

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Sea Ice Report #11.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
14/03/2018

Antarctica

Figure 1 shows a sea-ice concentration anomaly chart for February 2018.

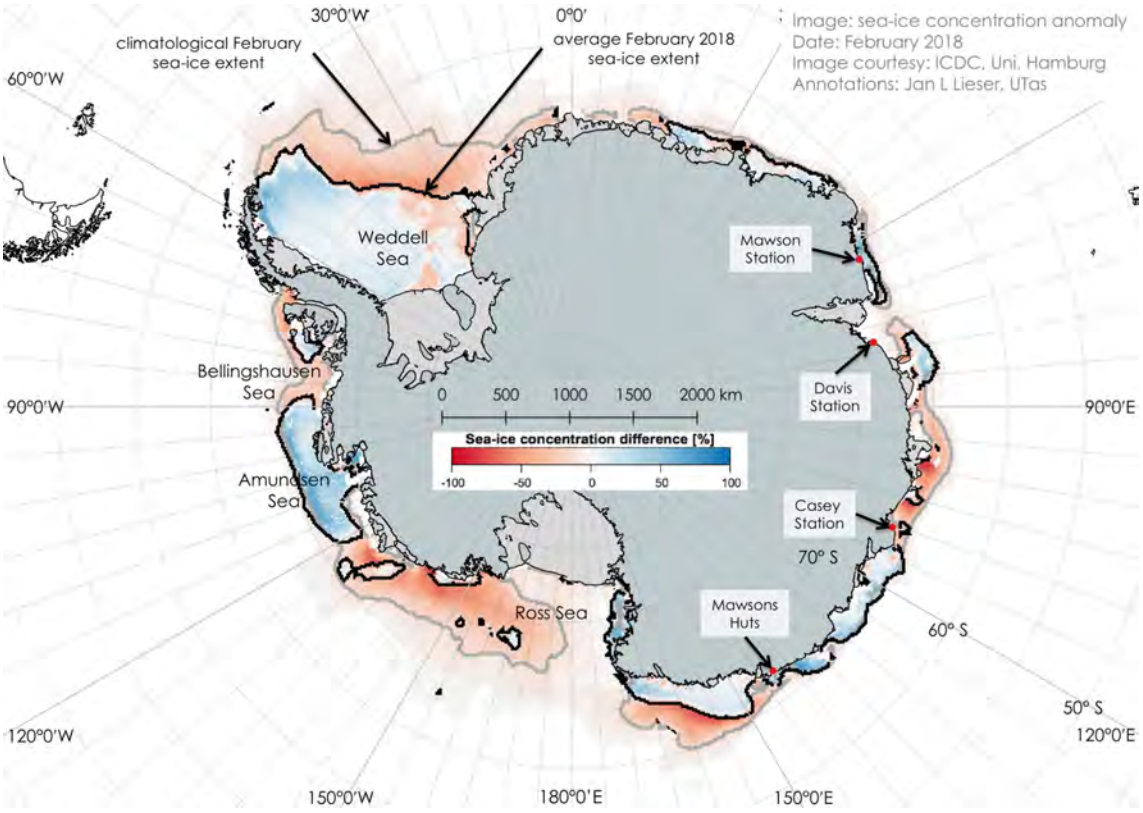

Figure 1: Sea-ice concentration anomaly for February 2018 provided by ICDC, Universität Hamburg.

In February 2018, the general below-average sea-ice concentration continued throughout most of Antarctica. The only notable exception was the Amundsen Sea, where slightly above average sea-ice extent was in company with slightly higher than normal sea-ice concentration. Between 115° E and 140° E sea-ice extent was very close to average with slightly above average sea-ice concentration within this extent.
The annual minimum sea-ice extent was reached on 18/02/2018 at 2.15×10^6 km^2, which marked the second lowest extent on record (the satellite era).

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Sea Ice Report #11.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
15/03/2018

Ross Sea

Figure 1 shows a high-resolution sea-ice concentration chart (3.125 km horizontal resolution) of the Ross Sea. Coloured contours indicate the location of the sea-ice edge on 11/03/2018 (red), 12/03/2018 (orange) and 13/03/2018 (yellow).

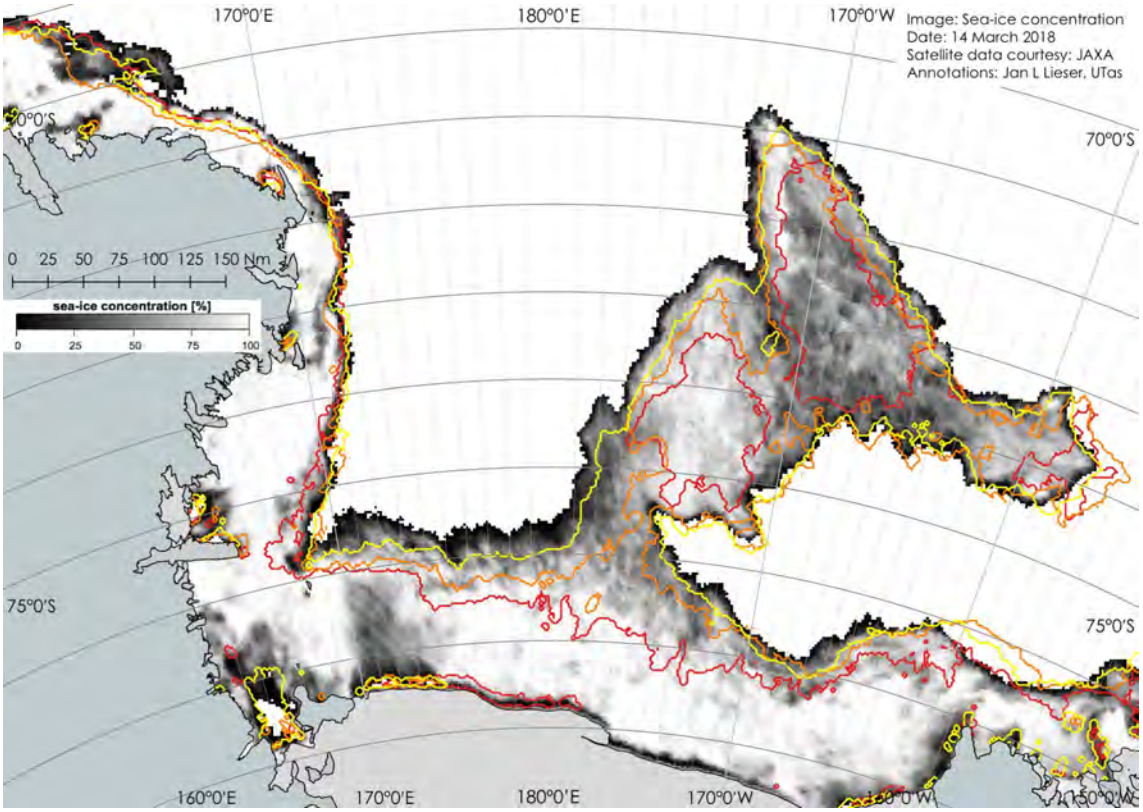

Figure 1: Daily composite sea-ice concentration data acquired 14/03/2018 and provided by ICDC, Universität Hamburg.

Sea-ice growth is well established in the Ross Sea, with most of the present sea ice being new sea ice except for near-shore sea ice west of 175° E and north of 73° S, where some sea ice has just survived the previous summer season.

The generally northwestward progression of the sea-ice edge is illustrated by the coloured contours in the figure.

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Figure 2 shows a high-resolution SAR scene of mostly new sea ice along 170° W. Coloured contours are as with Figure 1, plus a white contour for 14/03/2018. A blue circle marks a large tabular iceberg that is surrounded by many smaller bergs.

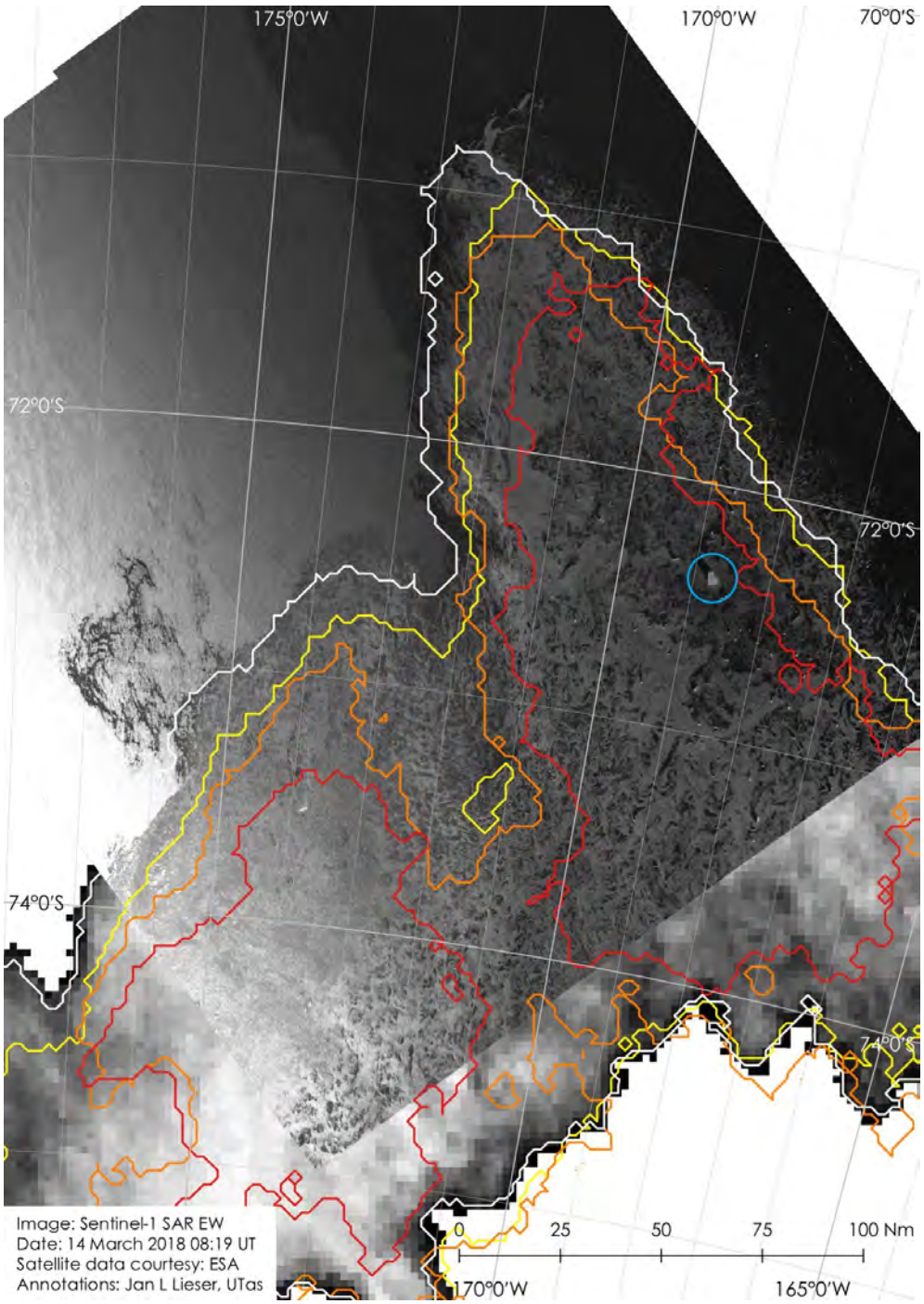

Figure 2: Sentinel-1a SAR EW data acquired 14/03/2018 at 08:29 UT and provided by PolarView; complemented by sea-ice concentration data (Figure 1).

The SAR highlights some strips and patches of sea ice, which are below the detection limit of the sea-ice concentration algorithm applied to the AMSR-2 data (Figure 1).

Sea Ice Report #11.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
15/03/2018

Iceberg D-15B

Figure 1 shows two high-resolution SAR scenes of iceberg D-15B north of the West Ice Shelf.

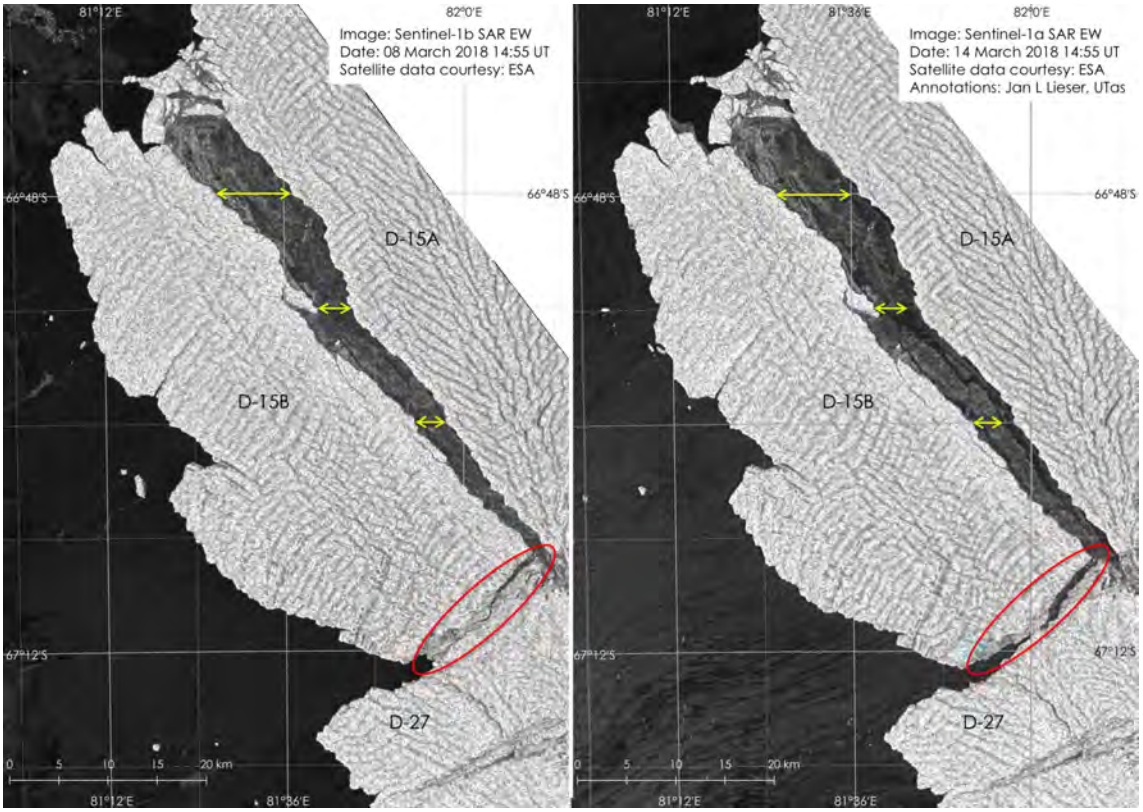

Figure 1: Sentinel-1 SAR data acquired 08/03/2018 (left panel) and 14/03/2018 (right panel) and provided by PolarView.

Since 08/03/2018 (left panel of the figure), the iceberg has shifted roughly 1 km southwestwards. Cracks of open water can be seen in the re-frozen part of sea ice between D-15A and D-15B. Yellow arrows have the same length in both panels at their respective latitude and indicate how much the berg has moved.

The most obvious shift can be seen at the iceberg's southern end (red ellipse), where a large rift has opened up.

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Sea Ice Report #11.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
16/03/2018

Ross Sea

Figure 1 shows a high-resolution sea-ice concentration chart (3.125 km horizontal resolution) of the western Ross Sea.

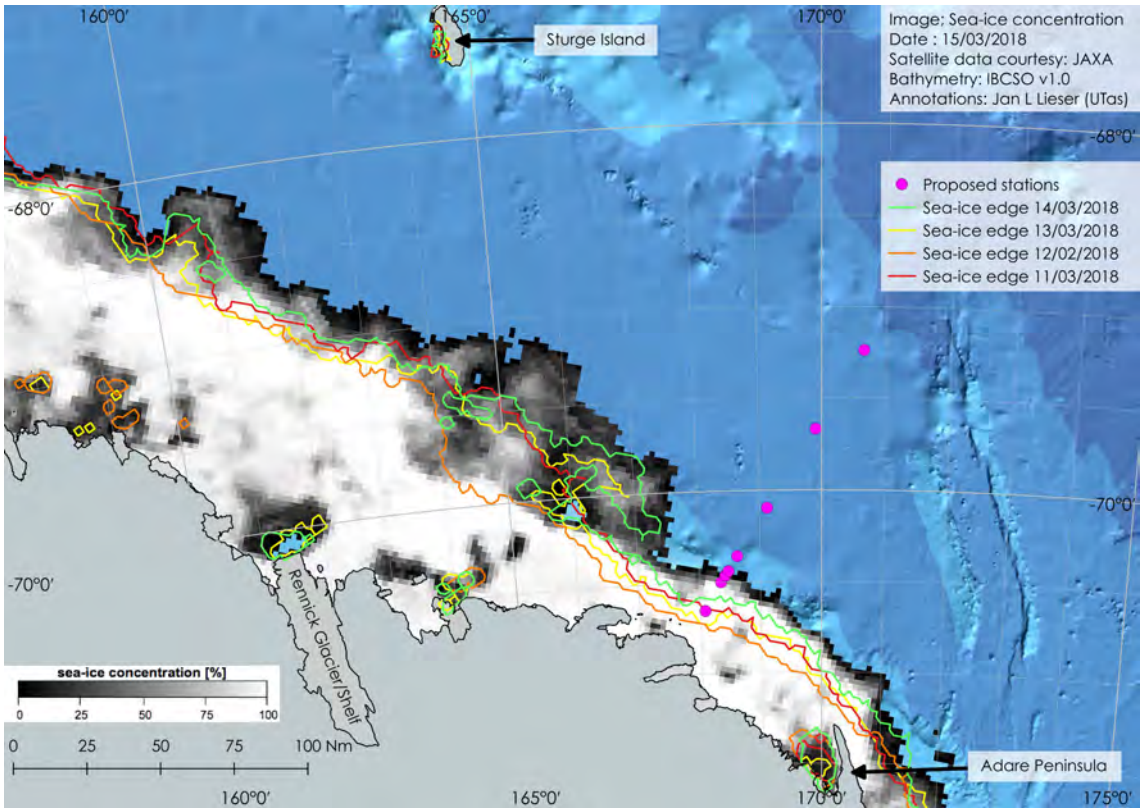

Figure 1: Daily composite sea-ice concentration data acquired 15/03/2018 and provided by ICDC, Universität Hamburg.

Sea ice is steadily expanding northward in the region. The sea-ice edge is expected to be influenced by a small-scale low pressure system, which was centred roughly at 164° E and 70° S on 15/03/2018 at 04:00 UT and moving eastward quickly. After the passage of this small system, the sea-ice edge might look more diffuse (fuzzy). This effect is seen in the sea-ice concentration data, where the marginal-ice zone is compacted ahead of the low centre (east of 168° E) and much more stretched out west of 167° E. As the AMSR-2 data were collected later in the day, the centre of the low had moved eastward already.

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Closer to the shore, the sea-ice zone is comprised of a mixture of second-year sea ice, which was transported out of the central Ross Sea northwestward around the Adare Peninsula, and newly forming sea ice. The southernmost proposed station is expected to be in the middle of this coastal band of various sea-ice types.

Sea Ice Report #12.1/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
19/03/2018

Ross Sea

Figure 1 shows a high-resolution sea-ice concentration chart (3.125 km horizontal resolution) of the western Ross Sea.

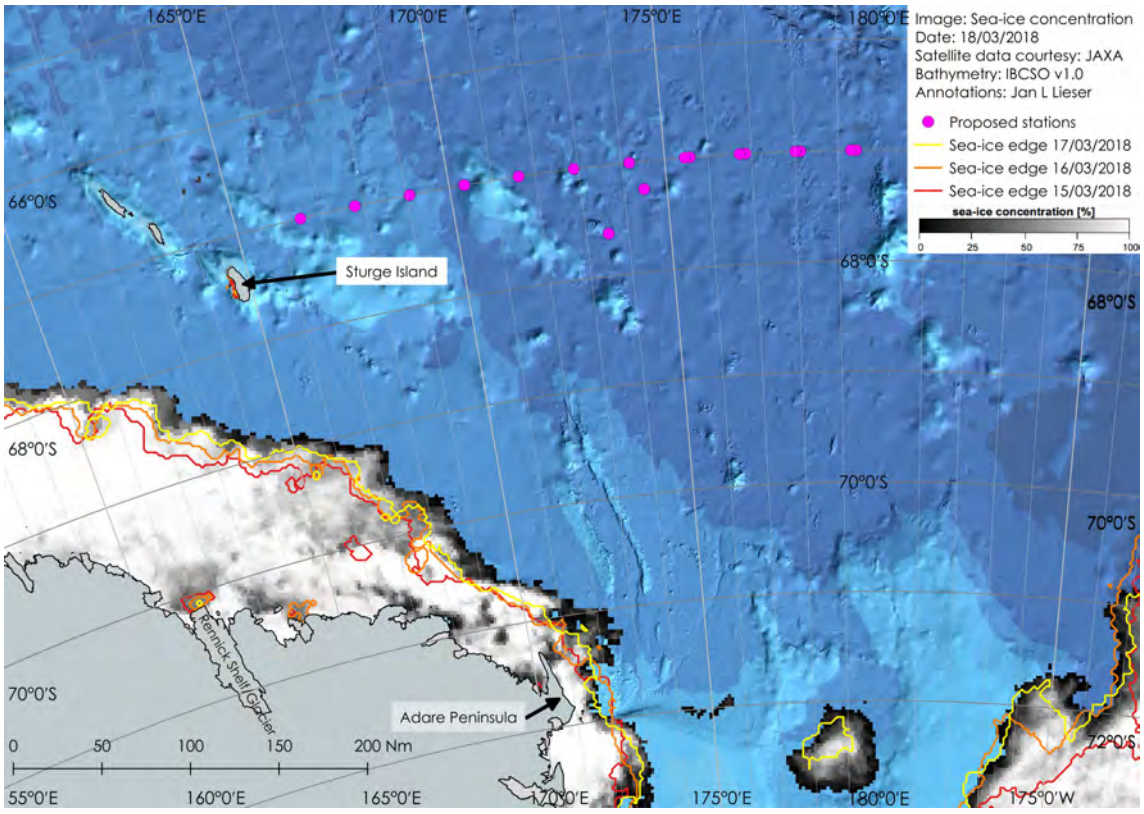

Figure 1: Daily composite sea-ice concentration data acquired 18/03/2018 and provided by ICDC, Universität Hamburg.

Sea ice continues its steady expansion northward and consolidation in the region. Compared with the wide (north-south extent) marginal ice zone on 15/03/2018 west of 167° E (see Sea Ice Report #11.4/2018), the sea-ice zone shows now much higher concentration and a more defined edge, which progresses northward by roughly 5 nautical miles per day.

In the entire Ross Sea, sea-ice grows quickly and a large patch of newly formed sea ice is atop Central Basin (178° 45' E and 72° 20' S), which started forming only two days ago.

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Sea Ice Report #12.2/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
19/03/2018

Chick Island

Figures 1 and 2 show a visible scene and the high-resolution SAR scene, respectively, of the northern end of the Moscow University Ice Shelf and Chick Island (green dot). Henry Islands are marked by a green circle.

At the end of summer 2018, the offshore region (of the frame of the figures) was largely free of sea ice. Now, sea-ice growth has started and new sea ice is forming between floating icebergs. One large iceberg is marked by a pink shape in both figures (in Figure 2, the dashed shape indicates the position two days earlier). This berg has travelled more than 12 km between the acquisitions of the two scenes.

The location of Chick Island is right at the fast-ice edge, where east and north of the island some fast ice has survived the last summer and west and south of the island fast ice has broken out. By contrast, Henry Islands are still enclosed by fast ice, however, north of Henry Islands, fast ice continues to break up although the freezing season has started. But we notice elsewhere also fast ice still breaking up, not least north of Totten Ice Shelf (west of the geographical frame of the figures).

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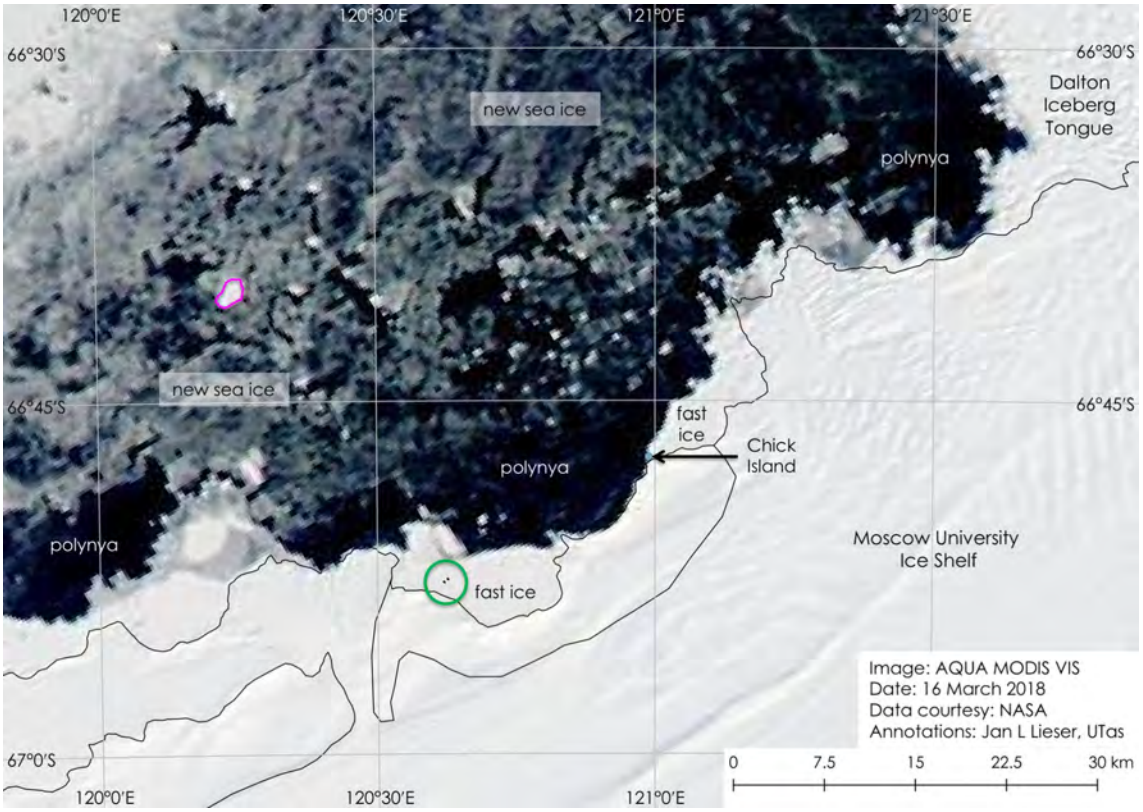

Figure 1: AQUA MODIS VIS data acquired 16/03/2018 and provided by NASA.

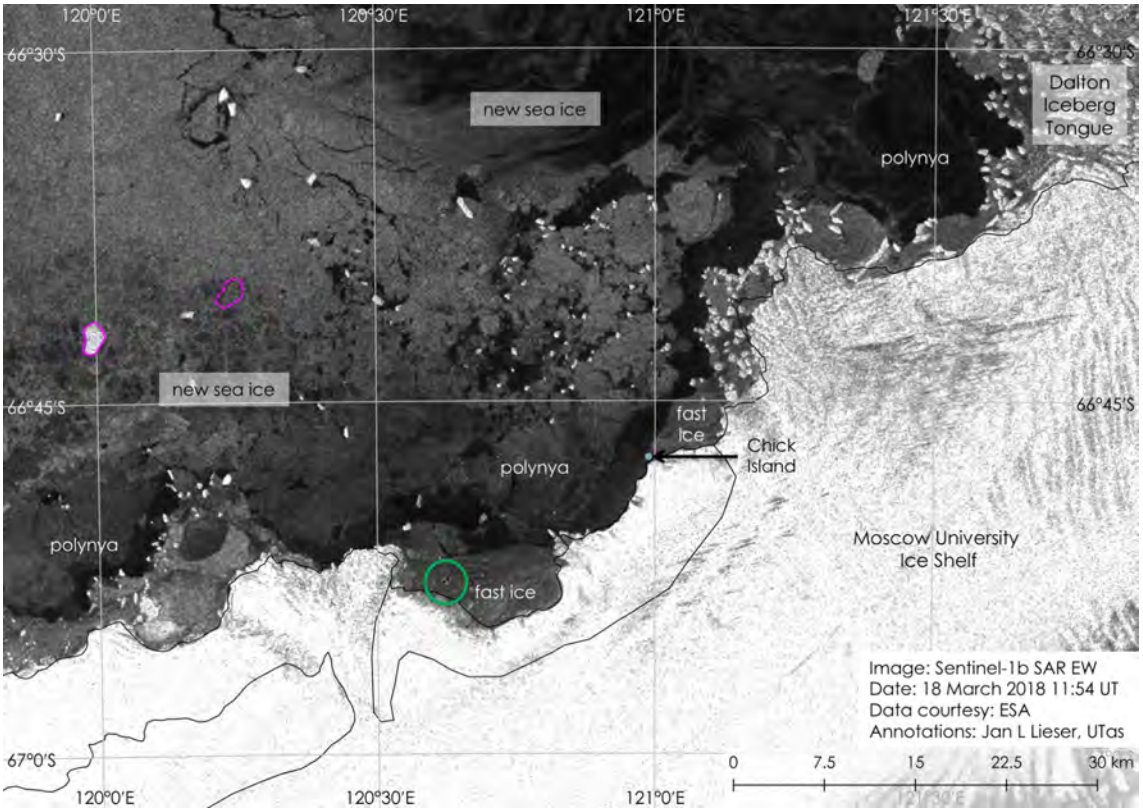

Figure 2: Sentinel-1b SAR EW scene acquired 18/03/2018 at 11:54 UT and provided by PolarView.

Sea Ice Report #12.3/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
20/03/2018

Ross Sea

Figure 1 shows a composite of high-resolution sea-ice concentration data and Sentinel-1a SAR scenes of the western Ross Sea.

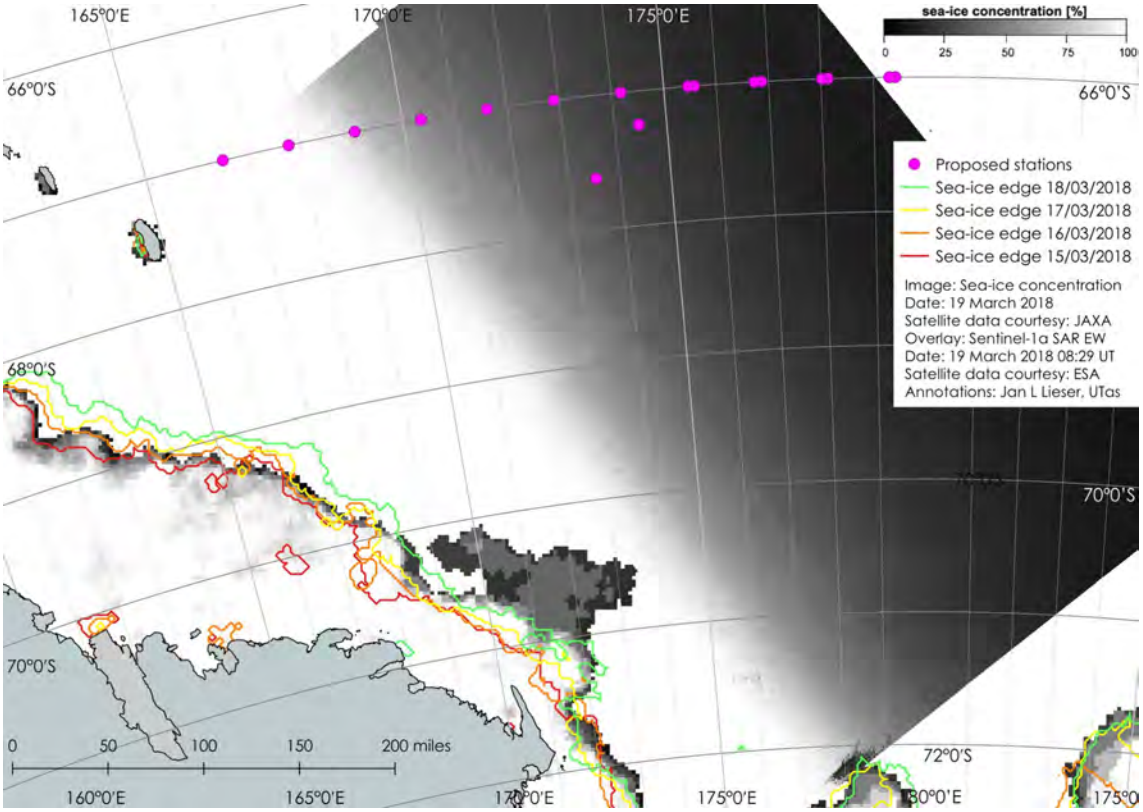

Figure 1: Daily composite sea-ice concentration data acquired 19/03/2018 and provided by ICDC, Universität Hamburg; Overlay: Sentinel-1a SAR EW scenes acquired 19/03/2018 at 08:29 UT and provided by PolarView.

West 170° E, the sea-ice edge can be seen compacted southward again, after the recent northerly wind in the region. Between 169° E and 173° E, a very large patch of apparent, homogeneously low (less that 40%) sea-ice concentration north of the sea-ice edge from 18/03/2018 (green line) is interpreted as a processing artefact (most likely caused by weather filters applied to the AMSR-2 data during the processing).

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The area illuminated by the SAR scenes is almost entirely free of sea ice. Only at the southern corner of the SAR (south of 72° S between 177° E and 180° E), new sea ice can be identified just north of the sea-ice edge line from 18/03/2018.

Figure 2 shows a zoom of the northern SAR scene of Figure 1. Many free-floating icebergs are in the region, some of which are marked by red circles.

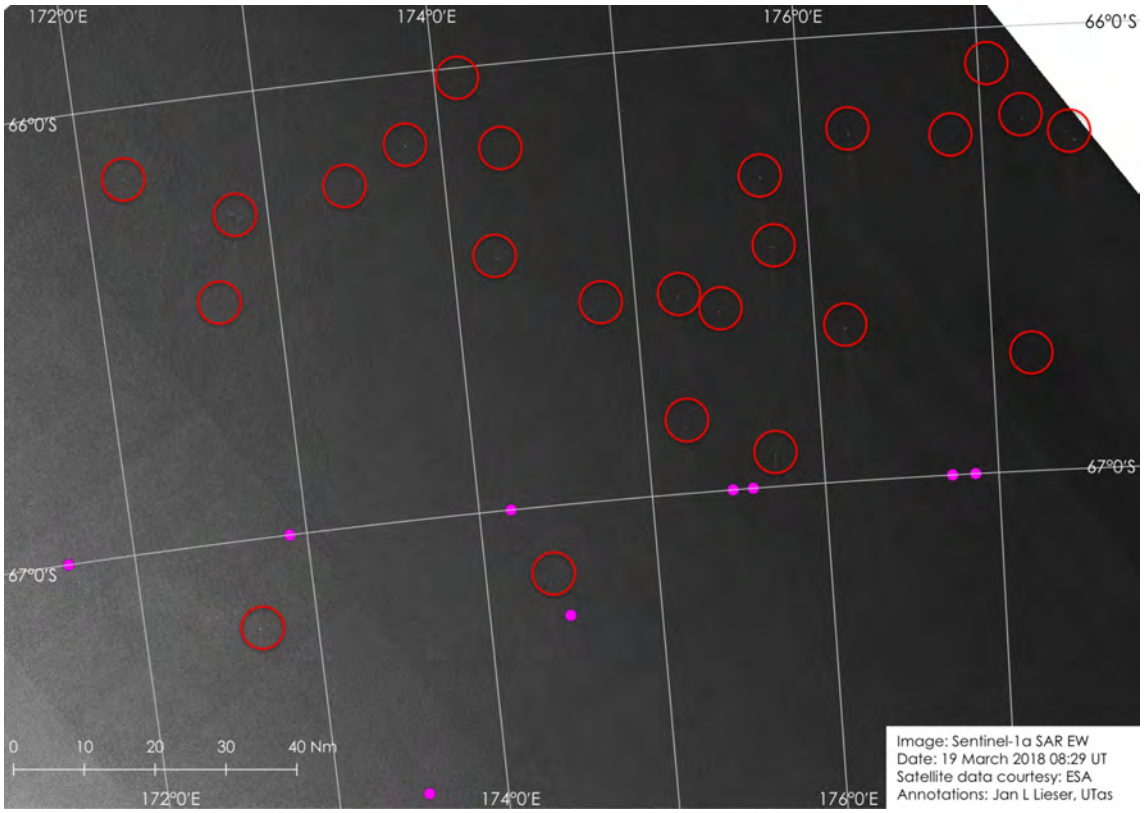

Figure 2: Sentinel-1a SAR EW scene acquired 19/03/2018 at 08:29 UT and provided by PolarView.

Sea Ice Report #12.4/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
22/03/2018

Ross Sea

Figure 1 shows a Sentinel-1a SAR composite of the western Ross Sea. Some free-floating icebergs are marked by red circles.

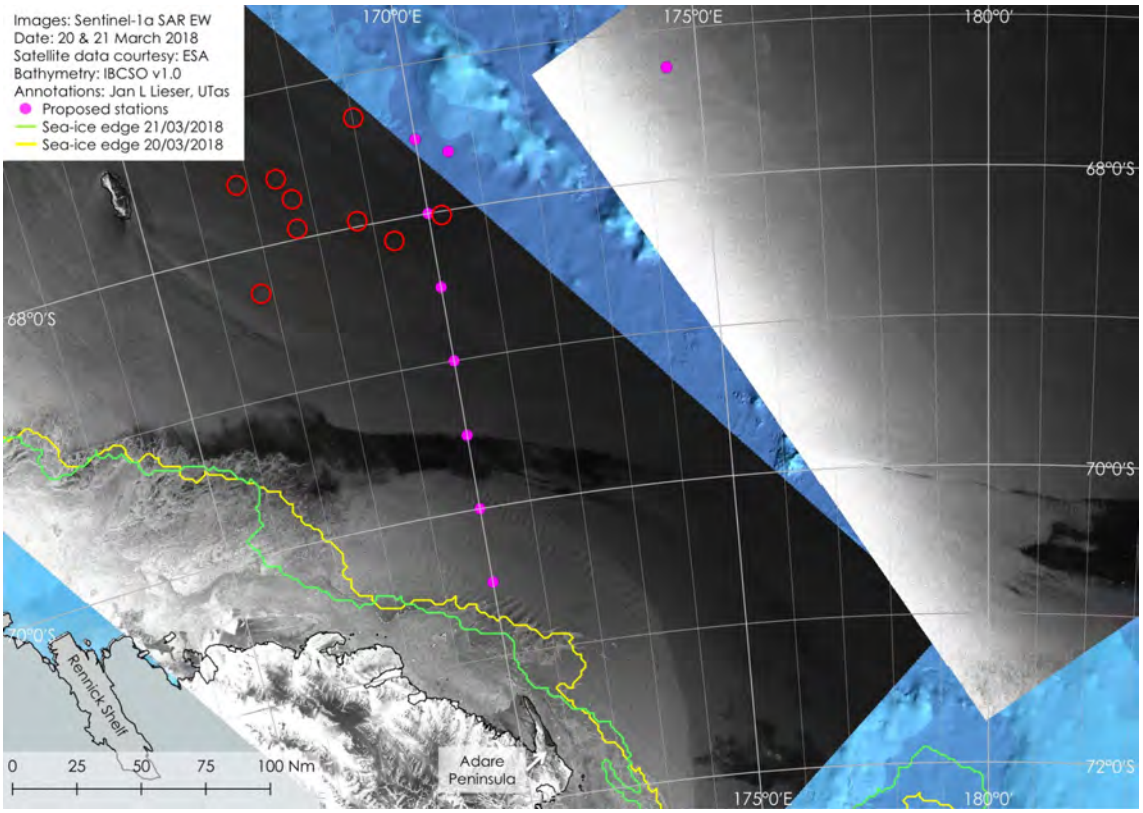

Figure 1: Sentinel-1a SAR EW scenes: southwestern swatch acquired 20/03/2018 at 09:08 UT, northeastern swath acquired 21/03/2018 at 08:12 UT and both provided by PolarView. Sea-ice edge data derived from daily composite sea-ice concentration data provided by ICDC, Universität Hamburg.

East of 166° E and north of 72° S, sea ice is largely confined to near-shore regions. West of 166° E and in the central Ross Sea (not shown), sea ice reaches further offshore.

The two southernmost, proposed stations are likely to be affected by new and young sea ice, even though both locations are north of the 15% sea-ice concentration ice-edge line.

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Sea Ice Report #12.5/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
22/03/2018

D'Urville Sea

Figure 1 shows a Sentinel-1a SAR of D'Urville Sea between Dumont D'Urville Station and the Mertz Ice Shelf. The yellow dot marks the position of an oceanographic mooring (currently in open water east of iceberg C-29).

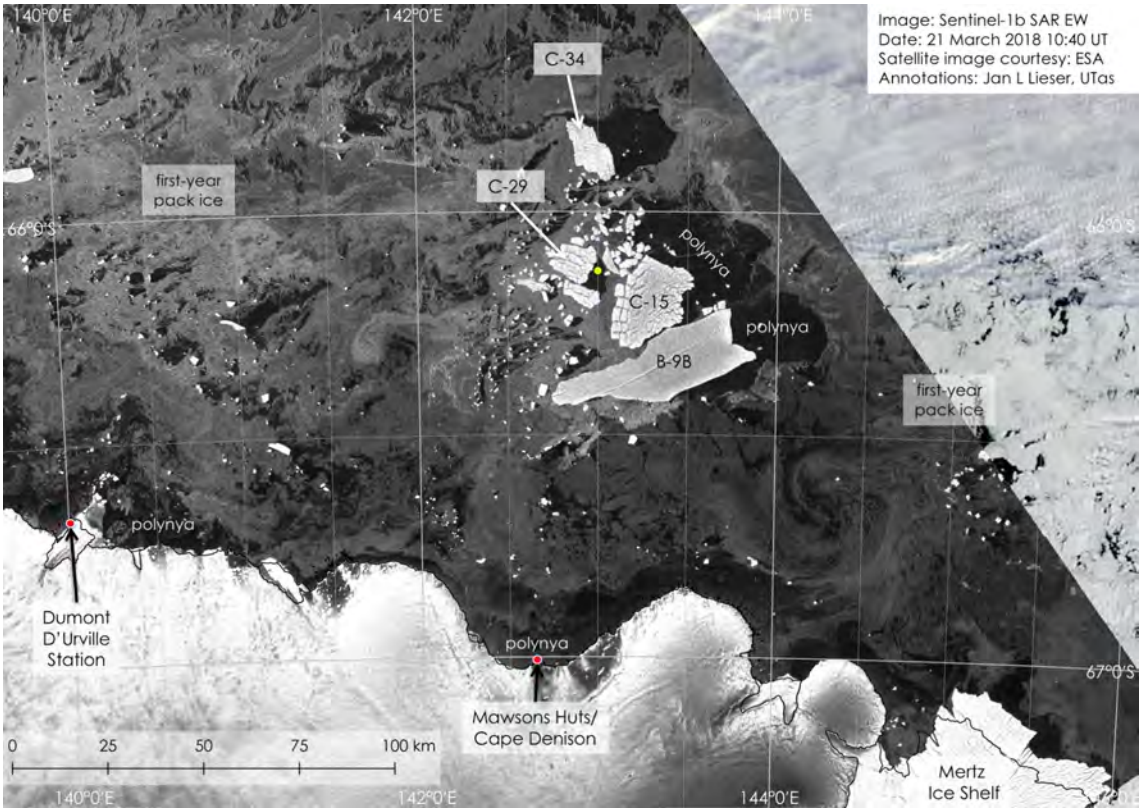

Figure 1: Sentinel-1b SAR EW scene acquired 21/03/2018 at 10:40 UT and provided by PolarView; complemented by AQUA MODIS VIS data acquired 21/03/2018 and provided by NASA.

New sea ice is forming between the many smaller icebergs, which can be seen as white dots in the SAR data. Four annotated very large, tabular icebergs are still slightly restless but surrounded by many smaller bergs, which are grounded.

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Sea Ice Report #12.6/2018

by the Sea Ice Service* of the
Antarctic Climate & Ecosystems Cooperative Research Centre and
Antarctic Gateway Partnership

Analyst: Jan L Lieser
23/03/2018

Ross Sea

Figure 1 shows high-resolution (3.125 km horizontal resolution) sea-ice concentration data of the Ross Sea.

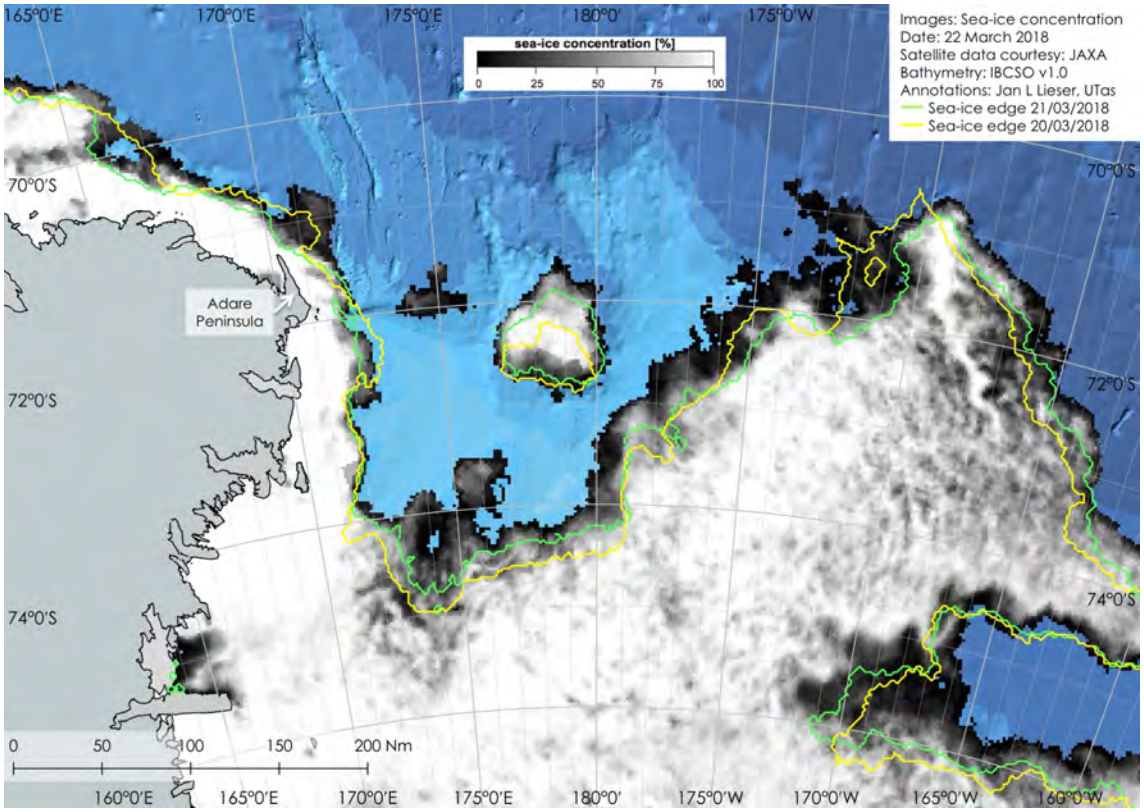

Figure 1: Daily composite sea-ice concentration data acquired 22/03/2018 and provided by ICDC, Universität Hamburg.

The growth of sea ice in the region is evident from the shift in the position of the sea-ice edge (yellow and green lines based on the same data product for previous days).

Figure 2 shows a SAR swath on a background of Figure 1. Rows of punch holes in the SAR data along 180° E are a data processing artefact.

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The SAR shows that new and young sea ice extends further north than the sea-ice edge suggests (the white line in Figure 2 shows the ice edge for 22/03/2018). Examples of areas of new sea ice are marked by red-white lines.

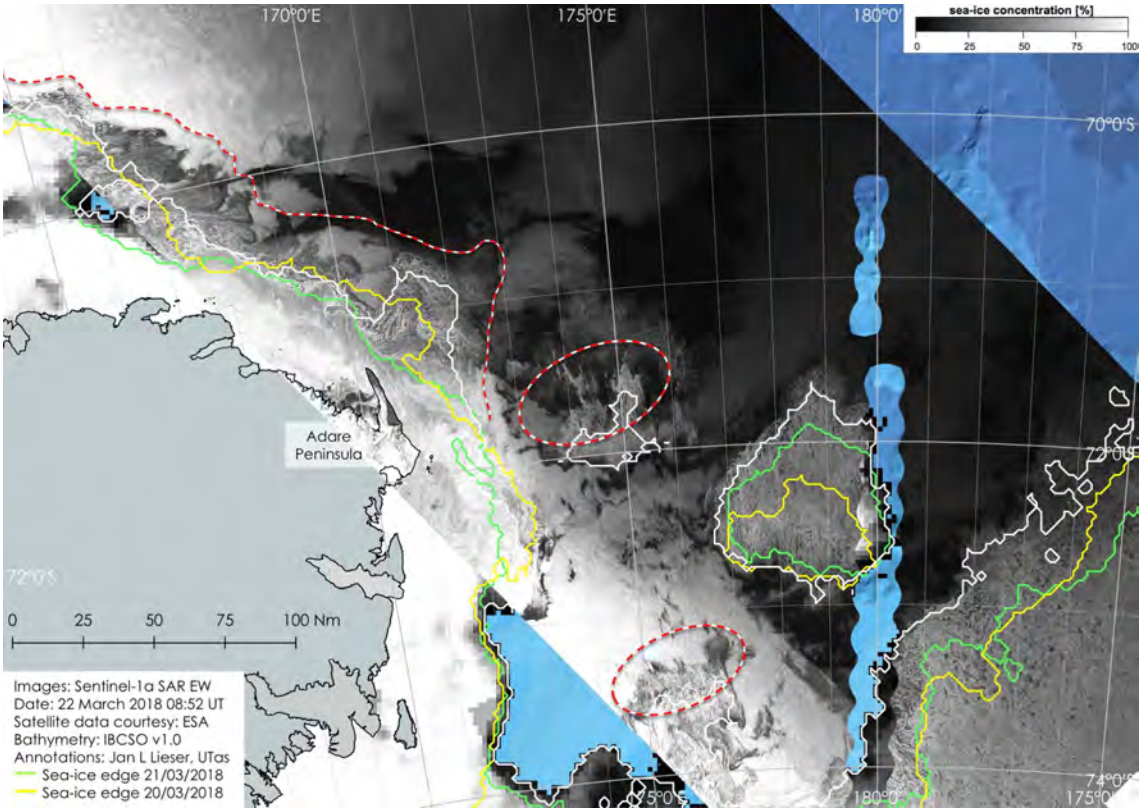

Figure 2: Sentinel-1a SAR EW swath acquired 22/03/2018 at 08:52 UT and provided by PolarView; complemented by sea-ice concentration data as shown in Figure 1.

About the author:

Jan L Lieser

Dr Jan L Lieser is a meteorologist and marine glaciologist with the Antarctic Climate & Ecosystems Cooperative Research Centre and the Antarctic Gateway Partnership at the Institute for Marine and Antarctic Studies of the University of Tasmania.

Jan is the leader of the Sea Ice Service at the University of Tasmania and his research interest is polar remote sensing with a focus on airborne imaging techniques using digital aerial photography and scanning LiDAR to estimate sea-ice thickness. He has also researched on-site polar meteorological observations and sea-ice geophysical properties, as well as numerical modelling of Arctic sea ice and Antarctic subglacial Lake Vostok. He was a wintering scientist at the German Neumayer Station and has participated in several field research programs in both Antarctica and the Arctic Ocean, conducted by the university's research partners, the Australian Antarctic Division and the German Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research. Jan has spent more than 450 days at sea, on-board icebreakers.

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